# Imperial Bureau of Plant Breeding and Genetics

## Plant Breeding Abstracts

Vol. XII, No. 2.

(Abstracts Nos. 302—634)

School of Agriculture
Cambridge
England

1st April, 1942.

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* General studies, see also individual crops.

# Plant Breeding Abstracts.

## Vol. XII, No. 2.

### Part I. Empire Section.

STATISTICS 519

302. KRISHNA IYER, P. V. 519.24:631.421:633.11
**The analysis of simple non-symmetrical experiments.**
Indian J. Agric. Sci. 1940 : **10** : 686–90.

The author gives an analysis of a variety trial with nine varieties of wheat (7 Pusa-strains, one Punjab, and one Cawnpore strain) which was carried out at the Government Agricultural Farm, Bahraich (U.P.). The experiment was laid out in 6 randomized blocks, but the yields of 17 of the $9 \times 6 = 54$ plots were very poor and had to be rejected. This upset the symmetry of the experimental design in a manner known to experimenters as the occurrence of missing plots. Most of the known methods of analysis have been derived by the method of least squares. A development of this technique leads the author to a more detailed analysis of the varietal mean yields into three groups (high yielders, medium yielders and low yielders). It is doubtful whether the computational labour involved is justified by the information gained through the analysis. H. O. H.

303. NAIR, K. R. and
MAHALANOBIS, P. C. 519.24:631.421:633.18
**A simplified method of analysis of quasi factorial experiments in square lattice with a preliminary note on joint analysis of yield of paddy and straw.**
Indian J. Agric. Sci. 1940 : **10** : 663–85.

In this paper (being No. 25 of the series:—Statistical Notes for Agricultural Workers) the authors describe the statistical analysis of an experiment on the comparative yields of grain and straw from 100 varieties of paddy. The experiment was carried out at the Chinsurah Farm, Bengal, and laid out in a quasi-factorial design ($10 \times 10$). The authors use the data from this experiment to illustrate a new procedure of analysis which has certain computational advantages when compared with the original method given by Yates (cf. "Plant Breeding Abstracts", Vol. VII, Abst. 12). Grain and straw are first analysed separately and significant varietal differences established in both cases. Dudkalma 191/36 yielded the highest weight of grain whilst Lalkalma 158/36 showed the highest yield of straw. An analysis of covariance (well illustrated by a scatter diagram) reveals that there is no intervarietal correlation between grain weight and straw weight. This leads up to the problem of how to use both plant attributes for grading the varieties as to their economic value. Two methods are given. One consists in attributing monetary values to both grain weight and straw weight, the latter being 7/32 of the former. An analysis of the compound monetary values reveals that Lalkalma 158/36 ranks highest. The second method, which does not appear to have any practical significance, consists of adding the two rank numbers which each particular strain occupies in a ranking with regard to grain weight and straw weight respectively.
H. O. H.

304. SUBRAMONIA IYER, S. 519.24:631.421:633.61
**A supplementary note on the analysis of $3^3$ and $3^4$ designs (with three factor interactions confounded) in field experiments in agriculture.**
Indian J. Agric. Sci. 1940 : **10** : 691–92.

The author corrects an error in a previous paper (see "Plant Breeding Abstracts", Vol. XI, Abst. 247). The correction concerns the calculation of partially confounded three factor interactions and its effect on the analysis of variance is considerable. The error was brought to the author's notice by Mr. P. H. Carpenter of the Tocklai Tea Experimental Station (Assam). H. O. H.

305. Gobeil, R. 519.24:634.9
Importance des statistiques dans les travaux forestiers. (**Importance of statistics in forestry work**).
La Forêt, Québec 1940 : **2** : No. 2 : 31–48.
The standard methods of statistical analysis of experiments are briefly outlined for foresters.

306. Lynch, P. B. 519.271.3:631.421:633.1
**Sampling methods for the estimation of grain yields in cereal trials.**
N.Z. J. Sci. Tech. 1940 : **22** : 151A–57A.
A reasonably efficient and practical field sampling technique for co-operative trials of cereals on farms is described. Satisfactorily low errors (the total error never exceeded 10%) have been obtained by using the method. About 8% of the plot area is sampled. It is considered that the practical advantages of the sampling method over the harvesting of whole plot method outweigh the loss of accuracy attending sampling methods.

## BREEDING 575

307. 575:633(54.8)
**Reports of subordinate officers of the Department of Agriculture, Madras, for 1939–40 (1940)** : Pp. 167.
**Report on the operations of the Department of Agriculture Madras Presidency for the year 1939–40 (1941)** : Pp. 81.

**Ragi (Eleusine coracana).**
Field trials with ragi were continued. Attempts are being made to evolve by hybridization a high yielding short-duration strain. The strain E.C. 1540 was found to have a very high protein and vitamin content.

**Millets.**
Strain testing and selection were continued. Selections were made from the $F_2$ generation of the crosses between Periamanjal cholam (*Sorghum vulgare*) and the African sorghums *S. caudatum* and *S. caffrorum*. Breeding for fodder improvement, resistance to *Striga* attack and resistance to yellow leaf disease was also carried out. Resistance to *Striga* attack appears to be a dominant character. A collection of sorghums from all parts of the world was grown and studied intensively.

**Rice.**
Three strains obtained by pure-line selection from local varieties were released for distribution. These were Co.13, Mtu.14 and Ptb.12. Trials of other strains, including the blast resistant strains 10998 and 11348, were continued. Trials also showed that a dwarf mutant strain obtained from X-rayed GEB.24 yielded higher than the original GEB.24 in both grain and straw. In other trials the dwarf mutants yielded higher than this parent strain under close planting and poor manuring. GEB.24, however, excelled the dwarf types under manured conditions. Pure line selection work was continued. Breeding by hybridization and the introduction of new varieties were also carried out. Tall and late promising selections from the X-rayed material are also being studied. Attempts were also made to induce mutations by subjecting seeds kept under cold storage from 1936 to temperatures of 75° C. and 80° C. A semisterile triploid mutant was found in seeds of Co.8 of the same material. Tetraploid rice was obtained by soaking seeds in a 0·1% colchicine solution for 24 hours. A highly sterile tri-specific hybrid was obtained by crossing the $F_1$ hybrid *O. sativa* ($n = 12$) x *O. officinalis* ($n = 12$) with *O. Eichingheri* ($n = 24$).

**Cotton.**
The improvement of "Cambodias" by selection was continued. Strains of Cambodias and "Salems" were tested. By colchicine treatment the chromosome number of a partially sterile $F_1$ hybrid between karunganni and *G. anomalum* was doubled. This tetraploid ($2n=52$) has the lint length of the karunganni parent and the fineness of *anomalum*. Its progenies are breeding true for these two characters. It can also be easily crossed with all American cultivated species. Breeding for resistance to the cotton stem weevil (*Pempheres affinis*) was continued. Derivatives from the Moco variety were again the most resistant forms. Work was continued on the Madras Nadam Breeding Scheme, the Madras Mungari Cotton Scheme and the Madras Cocanadas Breeding Scheme.

**Oil plants.**
Selection and breeding work was continued with gingelly (*Sesamum indicum*), castor (*Ricinus communis*) and coconuts (*Cocos nucifera*).

**Groundnuts.**
Selections and yield trials were continued. Nineteen crosses for combining economic characters have been made. The 1–2 seeded pod condition is dominant to the 1–3 seeded condition and these two characters behave as simple allelomorphs.

## GENETICS 575.1

308. 'Espinasse, P. G. 575.1(47)
**Genetics in the U.S.S.R.**
Nature, Lond. 1941 : **148** : 739–43.
The major part of this article deals with the report of a Conference on Genetics and Selection held in the U.S.S.R. in 1939 (see "Plant Breeding Abstracts", Vol. XI, Abst. 321). The questions discussed included the meaning, reality and the interpretation of the Mendelian ratio of 3 : 1, the usefulness of Mendelian analysis to animal and plant breeders, vernalization and "vegetative hybridization". This report provided the basis for a discussion meeting of the Society for Cultural Relations with the U.S.S.R. held in October 1940 at the Caxton Hall, London.

## CYTOLOGY 576.3

309. Darlington, C. D. 576.312.38
**Chromosome chemistry and gene action.**
Nature, Lond. 1942 : **149** : 66–69.
The first part of this article reviews our knowledge of the cycle of attachment and detachment of thymo-nucleic acid to and from the chromosomes in the mitotic cycle, of the formation and disappearance of nucleoli (these contain the ribose form of nucleic acid), of the behaviour of the centromere and the nucleolar organizer (it is suggested that both these bodies are compound genes), of the chemical constitution of euchromatin and heterochromatin, and of the relation between the heterochromatin content of nuclei and the size of nucleoli. Caspersson's ideas on the connexions between protein synthesis and the nucleic acid contents of the chromosomes and nucleoli are also mentioned. The second part of the article "represents the first attempt to describe chromosome structure and activity in relation to cell processes as a whole." The results of two types of experiment are considered—first the effect of inert chromosomes on the general metabolism of the cell and secondly the control of the nucleic acid content of inert chromosomes by various means (e.g. by low temperature or by the genotype). It is suggested that the inert chromosomes are not indeed inert but that they are non-specific in their activity and take part indiscriminately in all gene and cell reactions. The second type of experiments shows the connexions between the nucleic acid content of the chromosomes, the spiralization cycle and the reproduction of the chromosome thread with its genes.

310. Parthasarathy, N. 581.6:581.04
**An Indian source for colchicine.**
Curr. Sci. 1941 : **10** : p. 446.
It is pointed out that the tubers of *Gloriosa superba L.*, a weed which is widely distributed in India and Ceylon, contain the alkaloid colchicine (the concentration being 0·3% of the dry weight of the tubers). Maize seeds treated with an extract of the tubers showed tetraploid sectors in their roots.

## PLANT DISEASES AND PESTS 632

311. Mather, K. 632.4:577.8
**Heterothally as an out-breeding mechanism in fungi.**
Nature, Lond. 1942 : **149** : 54–56.
It is suggested that heterothally in fungi is an outbreeding mechanism and that the so-called sexual races of fungi are no more races than are any pair of fully cross-compatible plants in species like the sweet cherry and the red clover. The breeding systems produced by the different types of heterothally are briefly considered.

312. FRANKEL, O. H. 633.11:575(93.1)
**"Fife-Tuscan" wheat. A new variety for "Tuscan land".**
N.Z. J. Sci. Tech. 1941 : **22** : 303A–08A.

The new variety Fife-Tuscan has been bred at the Wheat Research Institute, Christchurch, New Zealand from the cross Tuscan x White Fife made in 1929. It is very similar to Tuscan in all characteristics and is recommended for localities where Tuscan is at present grown. In 21 autumn-sown trials grown at different places from 1935–36 to 1939–40 it has outyielded Tuscan by an average of 3·6 bushels per acre, or 9·5% and has never been significantly lower than Tuscan.

313. PLATT, A. W.,
DARROCH, J. G. and 633.11:581.44:575.11
KEMP, H. J. 633.11–2.7–1.521.6:575.11
**The inheritance of solid stem and certain other characters in crosses between varieties of *Triticum vulgare*.**
Sci. Agric. 1941 : **22** : 216–24.

The object of the breeding programme at Swift Current, Sask., of which this study forms part, is the production of wheats with solid straw (for resistance to wheat-stem saw-fly, *Cephus cinctus*), rust resistance and other desirable characters. The hollow-stemmed parents were Thatcher and Renown, which are rust resistant, awnletted and white-chaffed. Of the solid-stemmed rust susceptible parents, S–615–9 and 5–615–11 are awned and brown-chaffed and S–633–3 and S–633–23 are awnletted and white-chaffed. The original solid-stemmed varieties S–615 and S–633 were received from Portugal *via* New Zealand.

The segregation for solid and hollow stems in the crosses Renown x S–615–9, Renown x S–633–3 and Thatcher x S–615–11 could be explained in terms of three factor pairs. Plants carrying all 6 recessive genes have solid stems, while those carrying 4 or more dominant genes have hollow stems. The expression of the character is greatly influenced by environment, in particular by season.

In these three crosses stem rust resistance was probably determined by a dominant resistance factor and by a dominant inhibitor of resistance. In the cross Thatcher x S–633–23 more factors were apparently involved as only 32 segregating and 1 resistant $F_2$ line were obtained out of 467.

The awnletted condition behaved as a simple dominant over awned and brown chaff as a simple dominant over white.

The $\chi^2$ test for independence showed that neither stem rust reaction nor glume colour were associated with solid stem while for stem solidness and awning a value of $P$ between 0·01 and 0·02 was obtained for the cross Renown x S–615–9 and between 0·8 and 0·9 for Thatcher x S–615–11.

It is concluded that no insurmountable obstacles exist for the execution of the programme, but that very large populations will have to be grown.

314. PAL, B. P. et al. 633.11:582(54)
**The description of crop-plant characters and their ranges of variation. III. The variability of Indian wheats.**
Indian J. Agric. Sci. 1941 : **11** : 477–92.

The present paper continues the study of genetic variability in Indian crop-plants and is on similar lines to the previous ones which dealt with cotton and rice (see "Plant Breeding Abstracts", Volume IX, Abst. 930).

The species cultivated in India are listed and the problem of classifying those species with a very large number of varieties such as *T. vulgare* is discussed.

The characters useful for classification are placed in two categories, viz. (1) those, primarily of a qualitative nature, which are not greatly influenced by external factors, and (2) quantitative characters which are much subject to fluctuation; some of these however are more easily distinguishable and vary less than others. The characters recommended for use are then described and the classes or grades to be distinguished for each of them are given. As a general rule it is suggested that a sample of 25 normal plants per variety should be taken for purposes of measurement or description and that the observations should be taken over a period of three successive seasons.

Coloured plates illustrating the variability in grain colour, and glume and awn colour are provided and photographs and drawings of a number of other characters are also given. A specimen schedule for describing wheat strains is appended and there is also an appendix on quality in wheat. B. P. P.

315. JOHNSON, T. and NEWTON, M. 633.11–2.452–1.521.6:581.036
**The effect of high temperature on the stem rust resistance of wheat varieties.**
Canad. J. Res. 1941 : **19** : Sect. C : 438–45.

Eighteen stem rust resistant wheat varieties—Iumillo, Gaza, Bokveld, Red Egyptian, N.A. 95 Egypt, Marquillo x Waratah, Hope, Hochzucht, Minor, Bobin Gaza Bobin, Federation x Acme, Syria, McMurachy, Kenya, Sweden, Rhodesian, Talberg and Eureka 2—and the susceptible variety Marquis were tested in the heading stage for their reactions to three physiological races of *Puccinia graminis Tritici* (races 56, 29 and 15) in the greenhouse at three different temperatures: a constant low temperature of about 60° F., a constant high temperature of about 80° F., and an intermediate temperature which fluctuated daily from 50° to 55° F. at night to 70° to 85° F. at midday. At the low and at the intermediate temperature some of the varieties were immune and others highly or moderately resistant. Only the control variety Marquis was susceptible at these temperatures. At the high temperature five varieties—Bokveld, Iumillo, Gaza, Red Egyptian and N.A.95 Egypt were immune or highly resistant; six varieties—Marquillo x Waratah, Hope, Hochzucht, Minor, Bobin Gaza Bobin and Federation x Acme—were moderately resistant; and seven varieties—Kenya, Syria, McMurachy, Sweden, Rhodesian, Talberg and Eureka—were moderately or completely susceptible. All the varieties except Bokveld were also tested in the seedling stage at 60° and 83° F. for their reaction to physiological races 15, 17, 19, 21, 29, 32, 36, 38, 48, 56, and 152. At the low temperature the following varieties were either immune or highly resistant to all the above eleven races—Iumillo, Gaza, Bobin Gaza Bobin, Eureka, Red Egyptian, Sweden, Kenya, McMurachy, Federation x Acme, Rhodesian, Syria and Talberg. N.A.95 Egypt was moderately resistant to all races, Minor moderately resistant to some and highly resistant to others, Hochzucht and Marquillo and Waratah were susceptible to races 36, 38 and 48 and Hope was susceptible to races 15, 17, 21, 29 and 32. In general the effect of temperature on seedling resistance was similar to its effect on adult plant resistance.

316. FORSTER, H. C. and CROLL, R. D. 633.11–2.484–1.521.6
**Varietal resistance to foot-rots in wheat.**
J. Aust. Inst. Agric. Sci. 1941 : **7** : 121–23.

Figures are given for the average foot-rot (mostly due to *Fusarium* spp.) severity of infection of four wheat varieties—Baldmin, Sepoy, Ranee 4H and Ghurka—grown in four different trials. Statistical analysis showed significant differences in varietal resistance, Ghurka and Ranee 4H being the resistant varieties. Further results confirmed the resistance of these two varieties. The varieties Regalia and Magnet also have resistance. It is suggested that, even if it be impossible to obtain varieties that possess complete resistance, it should be possible to utilize the more resistant types to breed wheats which have at least a considerable degree of tolerance to foot-rot.

## OATS 633.13

317. ASHBY, E. and MAY, V. 633.13–2.112–1.521.6:578.08
**Physiological studies in drought resistance. I. Technique.**
Proc. Linn. Soc. N.S.W. 1941 : **66** : 107–12.

Two varieties of oats (Algerian and Fulghum) were grown in sand cultures in a plant-house at two levels of nitrogen manuring and with two water treatments, normal watering and drought (no water from April 6th to May 13th). Rate of growth was measured as increase in plant height. During the drought period there was little growth in any of the plants, whether subjected to the drought or not. After the drought there was no striking difference between the growth of control and drought-treated Algerian plants. The growth of the control

Fulghum plants was, however, much greater than that of the drought-treated plants. Algerian is thus more drought-resistant than Fulghum. The data also suggest that drought resistance is an inverse function of growth rate.

## MAIZE 633.15

318. RATTRAY, A. 633.15:575.125:575(68.9)
**Hybrid-maize.**
Rhod. Agric. J. 1941 : **38** : 535–37.

Inbred lines of maize are being developed in Rhodesia for the production of hybrid seed. Some first crosses have yielded 30% or more than the controls. A large amount of variance still exists in most of the inbreds and further inbreeding is required before hybrid seed can be distributed.

## BARLEY 633.16

319. HUNTER, H. 633.16:575:007
**Dr E. S. Beaven.**
Nature, Lond. 1941 : **148** : 776–77.

An obituary of Dr E. S. Beaven, the English barley breeder. Dr Beaven bred the well-known and widely grow variety Plumage Archer.

## MILLETS AND SORGHUM 633.17*

320. NARASIMHAN, M. J. 633.171:575(54.8)
**Early maturing ragi.**
Mysore Agric. Cal. 1940 : 20–21.

A short account is given of an early variety of ragi, K.1. This variety was selected as a Kar ragi from the Kar area in Mysore district. Mention is also made of other early selections.

321. RANGASWAMI AYYANGAR, G. N. and
PONNAIYA, B. W. X. 633.174:575.061.6:581.46
**Two new genes conditioning the tint of the colour on the glumes of sorghum.**
Curr. Sci. 1941 : **10** : 410–11.

Two new genes for glume colour in sorghum are described. The recessive factor *cd* causes a dilution in colour and the dominant factor *Ci* a more or less complete inhibition of pigment formation.

322. DARLINGTON, C. D. and
THOMAS, P. T. 633.174:576.312.341:576.35:581.331.2
**Morbid mitosis and the activity of inert chromosomes in *Sorghum*.**
Proc. Roy. Soc. 1941 : **130** : Ser. B : 127–50.

*Sorghum purpureo-sericeum* has five pairs of normal, or A, chromosomes and a variable number of B chromosomes (see also "Plant Breeding Abstracts", Vol. XI, Abst. 271). The B chromosomes are lost in the radicle before seed ripening and in the shoot tissues as they reach maturity. They persist, however, in the anthers and ovaries. Examination of mitotic divisions in the young flower tissues of two plants showed that the B chromosomes were lost by their failure to come on to the metaphase plate followed by formation of micronuclei. Several types of B chromosomes were found. At meiosis the B chromosomes pair with one another when homologous. Pollen grains with B chromosomes have a delayed first pollen grain division and in many such grains extra divisions of the vegetative nucleus occur to form cells with 2–5 peripheral nuclei. At the second division of the pollen grain the B chromosomes always pass to the generative pole undivided. Pollen grains with 3 or more peripheral nuclei (which act as generative nuclei) do not function and die. The B chromosomes appear to be largely heterochromatic. The action and significance of the B chromosomes and the relations between spontaneous structural changes in heterochromatic chromosomes and malignant mitosis are discussed in the final parts of this paper.

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* See also Abst. 307.

323. RANGASWAMI AYYANGAR, G. N. and
PONNAIYA, B. W. X. 633.174:581.46:575.11
**The occurrence and inheritance of a bloomless sorghum.**
Curr. Sci. 1941 : **10** : 408–09.

An African sorghum of the *S. elegans* group (M.B.S. No. A.S. 4572) was found to be absolutely bloomless. The $F_2$ generation from a cross between bloomless and heavy bloomed showed a ratio of 3 heavy bloomed: 1 absolutely bloomless and the $F_2$ generation of a cross between bloomless and sparsely bloomed a ratio of 9 heavy bloomed: 3 lightly bloomed: 4 bloomless. Both $F_1$'s were heavy bloomed. Seventeen selections from the $F_2$ of the latter cross were also examined in the $F_3$. The gene pair for bloomed and absolutely bloomless are *Bm* and *bm* and a second gene *H* controls the heavy as against the light bloomed condition. Seven of the selections also showed segregation for pithy and juicy stalks (genes *D* and *d*).

324. RANGASWAMI AYYANGAR, G. N. and
KRISHNASWAMI, N. 633.174:581.48:575.1
**Studies on the histology and colouration of the pericarp of the sorghum grain.**
Proc. Indian Acad. Sci. 1941 : **14** : Sect. B : 114–36.

The structure and development of the pericarp is described in both wild and cultivated sorghums. The grain colour, the thicknesses of the following layers—epidermis, hypoderm, mesocarp, tube cells, integument, total pericarp and aleurone—and the colour deposition in the above layers are given for fifty samples. Some $F_1$ hybrids, both parents of which had no integuments, were found to have integuments—this suggests that integument formation is caused by complementary genes.

## RICE 633.18*

325. PATANKAR, V. K. 633.18:575(54.7)
**Improvement of Ratnagiri rices by breeding. Part 1.**
Bull. Dep. Agric. Bombay 1938 (1939) : No. 181 : Pp. 61.

The climate, soil conditions and cultural methods in the Ratnagiri rice area are described. At least 59 rice varieties are grown in the district. The breeding work has resulted in the isolation of a number of improved strains, the most important of these being Patni-6 and Kudai-25 among the early strains, Panwel–61 and Waksal-207 in the mid-late and Bhadas-79, Varangal-420 and Varangal-487 in the late group. Descriptions are given of these strains.

326. 633.18:575(54.8)
SHARMA, S. V. 633.18:582
**Paddy cultivation in Mysore.**
Bull. Dep. Agric. Mysore 1939 : No. 20 : Pp. 42.

In Chapter 3 of this bulletin some of the main strains of rice bred by the Paddy Breeding Station at Nagenahalli are described. The strains which have been distributed are S.67 (Kembuthi–5), S.139 (Kaddi 62), S.236 and S.216 (Nagpur 36 and 46), S.476 (Pattasamonahalli–55), S. 590 (Sakalathi C.98–10), S.197 and S.199 (Alur Sanna 39 and 41), S.269 (Gunasale 9), five selections from a plot of G.E.B.24 (S.661, S.683, S.684, S.699 and S.701), S.624 and S.625 (Maharajabhogam C.83–14 and C.83–15), S.396 (Hebbal three month–2), S.705 (Bangarakaddi C.40–1), S. 328 (Banku–11), S.317 (Hālubbahi 25) and S.547 (Chintamin sanna 30). In Chapter 4 the breeding work of the Station is described. In addition to the selection work, breeding by hybridization is carried out.

327. KADAM, B. S.,
GADKARI, M. V. and
PATIL, G. G. 633.18:581.46:575.24
**A long-glumed mutation in rice.**
Curr. Sci. 1941 : **10** : 331–33.

While making individual plant selections from a bulk sample of an early local Kolamba variety of rice, a plant with long glumes was found. Observations showed that this new type was due to a mutation and not to either a mechanical mixture or a natural cross. It is suggested that the long glume character would be useful for distinguishing superior strains from local coarser types.

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* See also Abst. 307.

328. RANGASWAMI AYYANGAR, G. N. and
PONNAIYA, B. W. X. 633.282:581.4:575.116
**The occurrence and inheritance of shoots from the axils of panicle branches in *Sorghum sudanense*.**
Curr. Sci. 1941 : **10** : 409–10.

An eligulate type of *S. sudanense* from Russia was found to have panicles with side shoots possessing two or three leaves and occasionally with small panicles in the axils of the branches of the main panicle. This type was crossed with a ligulate type with normal panicles. In the $F_2$ from this cross there were obtained 229 normal ligulate plants and 74 eligulate plants with axillary shoots in the panicle. The $F_3$ results, however, showed that the factor for eligulateness and the factor for axillary panicles could occasionally cross-over, the cross-over value being about 0·01%.

329. RANGASWAMI AYYANGAR, G. N. and 633.282:582
PONNAIYA, B. W. X. 633.282:575.11:581.46
**Studies in *Para-sorghum* Snowden—the group with bearded nodes.**
Proc. Indian Acad. Sci. 1941 : **14** : Sect. B : 17–24.

This is the third of a series of articles on groups of *Sorghum*—(for the previous two articles see "Plant Breeding Abstracts", Vol. X, Abst. 284, and Vol. XI, Abst. 860). There are four known species in the sub-section *Para-sorghum—S. purpureo-sericeum, S. dimidiatum, S. versicolor* and *S. nitidum*. The group is characterized by the hairiness of the plants, bearded nodes, very long awns and a chromosome number of $2n = 10$. Descriptions are given of the four species. *S. dimidiatum* hybridizes easily with *S. purpureo-sericeum* and in this cross the difference between fully and half coriaceous glumes is governed by a single gene. Attempts to hybridize species of the *Para-sorghum* section with members of the *Eu-sorghum* group were not successful. Species of the *Para-sorghum* group are of little value as fodder plants in S. India.

## LEGUMINOUS FORAGE PLANTS 633.3

330. FARLEY, H. M. and
HUTCHINSON, A. H. 633.31:581.3
**Seed development in *Medicago* (alfalfa) hybrids. 1. The normal ovule.**
Canad. J. Res. 1941 : **19** : Sect. C : 421–37.

An account is given of the development of the nucellus, megaspores, integuments, funicle, female gametophyte, embryo and endosperm of British Columbian *Medicago* lines. These plants are descended from crosses involving *M. media* and *M. falcata*.

331. CORKILL, L. 633.322:581.192:575.11
**Cyanogenesis in white clover (*Trifolium repens* L.). I. Cyanogenesis in single plants.**
N.Z. J. Sci. Tech. 1940 : **22** : 65B–67B.

MELVILLE, J. and
DOAK, B. W.
**Cyanogenesis in white clover (*Trifolium repens* L.). II. Isolation of the glucosidal constituents.**
Ibid 1940 : **22** : 67B–71B.

COOP, I. E.
**Cyanogenesis in white clover (*Trifolium repens* L.). III. A study of linamarase, the enzyme which hydrolyses lotaustralin.**
Ibid 1940 : **22** : 71B–83B.

MELVILLE, J.,
COOP, I. E.,
DOAK, B. W. and
REIFER, I.
**Cyanogenesis in white clover (*Trifolium repens* L.). IV. Methods of determination and general considerations.**
Ibid 1940 : **22** : 144B–54B.

Papers II, III and IV in this series are concerned with the chemical aspects.
In paper I it is reported that of 137 plants tested, 96 contained both cyanogenetic glucoside and the enzyme which hydrolyzes the glucoside; 17 contained the glucoside but not the enzyme, since they did not produce HCN except in the presence of the enzyme linamarase, 10 contained the enzyme but not the glucoside, since they did not produce HCN except in the presence of the cyanogenetic glucoside lotaustralin; 14 contained neither glucoside nor enzyme, since they did not produce HCN at all.
It is pointed out that Williams' (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1305) tests did not distinguish plants having enzyme or glucoside but not both from plants having neither. Hence further light may be thrown on the inheritance of cyanogenesis if this analysis is used.

## ROOTS AND TUBERS 633.4

332. 633.42:582
HOWARD, H. W. 633.853.49:582
**The nomenclature of *Brassica* species.**
Curr. Sci. 1940 : **9** : 494–95.
It is suggested that in future the name *B. campestris* should be reserved for forms with $2n = 20$ and the name *B. napus* for forms with $2n = 38$. In particular the Indian oil-seed crop toria ($2n = 20$) should not be called either *B. napus* L. var. *dichotoma* Prain or *B. campestris* subsp. *napus* var. *toria*. It is suggested that toria should be called *B. campestris* L. var. *toria*.

## FIBRES 633.5*

333. PANSE, V. G. 633.51:581.6:575
**A statistical study of the relation between quality and return per acre in cotton.**
Indian J. Agric. Sci. 1941 : **11** : 546–65.
From figures obtained from the Indian Central Cotton Committee's Technological Laboratory, Bombay, the regression equation showing the relationship between spinning value (highest standard warp counts) and price was obtained. From this equation it is shown that the average premium obtained for Cambodia (mean spinning value 27·3) was 10·46% over local cotton in Malwa, *G. arboreum* var. *neglectum* forma *bengalensis* (mean spinning value 12·1) and 5·94% over the improved indigenous, Malvi 9 (mean spinning value 18·3). But figures from variety trials show that the yield per acre of Cambodia was so much below that of Malvi 9 and local cottons that it would yield the cultivator a lower cash return. Other data suggest that this phenomenon is rather widespread. It is concluded therefore that yield should receive primary consideration when introducing superior varieties.

334. LUTHRA, J. C. and
VASUDEVA, R. S. 633.51–2.485–1.521.6
**Studies on the root-rot disease of cottons in the Punjab. IX. Varietal susceptibility to the disease.**
Indian J. Agric. Sci. 1941 : **11** : 410–21.
Of a large number of indigenous and exotic varieties of cotton tested for resistance to root rot (caused by *Rhizoctonia solani* and *R. bataticola*) none showed any appreciable resistance. Attempts to obtain resistant strains by selection from healthy plants in highly disease-infected areas were unsuccessful. B. P. P.

335. NODDER, C. R. and
GILLIES, A. S. 633.523:581.6:578.08
**A technique for spinning yarn samples from small quantities of fibre.**
Tech. Res. Mem. Indian Cent. Jute Cttee. 1940 : No. 1 : 1–23.
This paper describes a technique of spinning representative yarn samples from small quantities of jute fibre. It is suggested that it would be very useful in selection and breeding experiments.

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* See also Abst. 307 (Cotton).

336. Venkoba Rao, B. 633.61:575(54.8)
**List of promising sugarcane varieties evolved under the Imperial Council of Agricultural Research scheme which are being issued for trial to the raiyats.**
Mysore Agric. Cal. 1940 : 70–72.

Venkoba Rao, B.
**A note on the two most outstanding sugarcane varieties H.M. 661 and H.M. 647.**
Ibid. 1941 : 19–20.

Descriptions are given in the first article of the following H.M. seedlings: 661, 647, 645, 659, 657, 653, 658, 656, 654 and 651. H.M. 661 was obtained from a cross between Co.281 and teosinte, H.M. 647 from Co.290, H.M. 645 from Co.281, H.M. 659 from Co.313 and the other six seedlings from P.O.J. 2878. It is stated that H.M. 661 "is full of promise and seems to be able to replace all other standard varieties". Further descriptions of H.M. 661 and 647 are given in the second article. H.M. 647 is said to excel its parent, Co.290, in very many economic and agricultural qualities.

337. McIntosh, A. E. S. 633.61:575(72.9)
**Progress in contributing colonies of seedlings released by the British West Indies Central Sugar-Cane Breeding Station.**
Trop. Agriculture, Trin. 1941 : **18** : 232–37.

Two types of seedling have been released—seedlings of noble cane derivation and nobilized seedlings. In future no more noble canes will be sent out since they are not so good as the nobilized seedlings. Tests of mosaic resistance have been carried out in Barbados and Jamaica. In Jamaica the majority of the seedlings have proved susceptible to mosaic. The following seedlings are described—B.2935, B.3439, B.34104, B.35187, B.35245 and B.37161. The seedling B.2935 (parentage Ba.11569 x Ba.6032) gives high yields of cane on good soils in low rainfall areas. It is resistant to gumming disease and occupies over 50% of the sugar area in St. Kitts. B.3439 from the cross Ba.11569 x Q.813 is probably the best general purpose noble cane ever produced in Barbados. It is resistant to root and gumming diseases. In Jamaica it shows a high degree of resistance to mosaic, a surprising feature for a noble cane. B.34104, parentage Co.281 x B.H.10(12), has an exceptionally high quality juice and is a medium-thin cane. In Barbados it is resistant to mosaic, gumming and root diseases but in Jamaica it is highly susceptible to mosaic. B.35187 from the cross [P.O.J.2725 x B.H.10(12)] x B.391 is a late cane suited to areas of high rainfall. B.35245, parentage Ba.11569 x P.O.J.234, is a cane with exceptionally strong ratooning. B.37161 from the cross [P.O.J.2379 x B.H.10(12)] x B.603 is a cane which yields well under all conditions. In Barbados it has outyielded the standard varieties by 20 to 80% in sugar yields.

338. Buzacott, J. H. 633.61–2.7–1.521.6:575
**The relationship between hardness of sugar cane and varietal resistance to the beetle borer (*Rhabdocnemis obscura* Boisd.).**
Tech. Commun., Bur. Sug. Exp. Sta., Dep. Agric., Brisbane 1940 : No. 8 : 127–52.

It is concluded that the principal factors contributing to borer resistance in a variety are hardness (with its related fibre), self-trashing, erectness of habit and resistance to top rot and that, if other factors are given due consideration, it is possible by means of hardness readings to forecast the reaction of a variety towards borers. The hardness of seedlings in the following progenies was determined—Badila (N.G.15) x C.2, Badila x Q.2, P.O.J.2878 x Badila and Oramboo x H.Q.409. Badila is a soft cane, C.2 moderately soft, Oramboo and H.Q.409 medium canes, P.O.J.2878 moderately hard and Q.2 a hard cane. The introduction of only one hard parent considerably increased the average hardness of a progeny.

339. Thuljaram Rao, J. 633.61–2.7–1.521.6:581.44
**Rind hardness as a possible factor in resistance of sugarcane varieties to the stem borer.**
Curr. Sci. 1941 : **10** : 365–66.

A positive correlation was found between rind hardness and resistance to stem borer (*Diatrea venosata*) in sugar canes. Thus the most resistant variety, Co.421, with a percentage infestation

of 29 had a rind hardness value of 17·3 lbs. while the most susceptible variety, Poovan (69% infestation), had a rind hardness of only 7·31 lbs. Anatomical investigations indicated that three major factors –the number of vascular bundles per unit area, the lignification of the bundle sheaths and the lignification of parenchymatous cells in the rind region—contributed to rind hardness. A general positive correlation was also found between the fibre content of a cane and its rind hardness.

## STIMULANTS 633.7

340. Nelson, N. T. 633.71:575(71)
**Tobacco research in Canada.**
Emp. J. Exp. Agric. 1941 : **9** : 265–76.

A section of this article is devoted to genetics and varietal improvement.
In the genetical work use has been made of *Nicotiana triplex* and of an amphidiploid *N. silvestris-tomentosiformis* produced by doubling the chromosomes of an $F_1$ by the callus method, the callus being induced by hormone treatment. The Mendelian basis of resistance to black root-rot and to mosaic has been worked out as well as that of leaf-base shape, chlorophyll deficiency and flower colour.
Details are not given of the plant breeding work but the use of the back-cross method is illustrated by the transference of mosaic resistance from Ambalema to each of the five flue-cured varieties. Work on the standardization and classification of strains is also mentioned. Some outstanding varieties, e.g. the burley variety Harrow Velvet, have been developed from this type of work.

341. Raghavan, T. S. and
Srinivasan, A. R. 633.71:575.127.2:576.354.4
**Cytogenetical studies in *Nicotiana*. Part I. Cytology of *Nicotiana glutinosa* and *N. Tabacum* var. *macrophylla* and the $F_1$ hybrid between them.**
J. Indian Bot. Soc. 1941 : **20** : 307–40.

Mitosis and meiosis in *N. glutinosa* ($2n = 24$) and in *N. Tabacum* ($2n = 48$) are described. The $F_1$ hybrids have a somatic chromosome number of $2n = 36$. At meiosis an average of 4·08 bivalents per pollen mother cell was observed in the hybrids. Degeneration of pollen mother cells, cytomixis, dyad formation and the occurrence of micronuclei were also observed in the hybrids.

342. Raghavan, T. S. and
Srinivasan, A. R. 633.71:575.127.2:581.321.1
**Cytogenetical studies in *Nicotiana*. Part II. Morphological features of *Nicotiana glutinosa* and the hybrid between *Nicotiana glutinosa* and *N. tabacum*.**
Proc. Indian Acad. Sci. 1941 : **14** : Sect. B : 35–46.

Descriptions are given of a hybrid between *N. glutinosa* and *N. Tabacum* and of its parents. The development of anthers, megasporogenesis and embryo formation in *N. glutinosa* and the development of the megaspore in the hybrid are described. The first division of the megaspore mother cell in the hybrid is very irregular, 4 bivalents and 24 univalents being formed. The two second divisions do not take place simultaneously. The megaspores and the whole ovule degenerate at a later stage.

343. MacRae, N. A. 633.71–2.8–1.521.6:575
**Breeding for mosaic resistance.**
Lighter, Ottawa 1941 : **11** : No. 4 : 9–11 (Mimeographed).

Mention is made of a strain of tobacco called Ambalema which possesses a high resistance to mosaic. The mosaic resistance of this strain has been found to be due to two recessive genes.

344. Srinivasan, K. H. and
Narasimhaswamy, R. L. 633.73:575(54.8)
**A review of coffee breeding work done at the Government Coffee Experiment Station, Balehonnur.**
Bull. Mysore Coffee Exp. Sta. 1940 : No. 20 : Pp. 16.

The coffee breeding work done at this station is described. Details are given of the four most

promising mother trees from the *Arabica* collections—S.26, S.31, S.44 and S.48. Cross-bred families from S.26 appear to be very promising. Breeding and selection have now been started with *C. robusta*. There is also a note on the disease (*Hemileia*) problem in relation to breeding work by W. Wilson Mayne (cf. Abst. **346** below).

345. 633.73–2.4–1.521.6:575(67.62)
**Report of the Coffee Board of Kenya for the year ended 30th June, 1941,** Pp. 31.

Individual tree recording has been continued on all estates and many selections have been made. Considerable progress has been made in the selection of trees showing marked resistance to Coffee Berry Disease, Elgon Die-buck and Leaf Disease (*Hemeleia vastatrix*).

346. Mayne W. W. 633.73–2.452–1.521.6:575(54.8)
**Annual report of the coffee scientific officer, 1938–39, 1939–40, 1940–41.**
Bull. Mysore Coffee Exp. Sta. 1939 : No. 19 : Pp. 16; 1940: No. 21 : Pp. 21; 1941 : No. 23 : Pp. 17.

The work on the resistance of coffee to leaf disease (*Hemileia vastatrix*) has been continued. At least four strains of *H. vastatrix* have been found at the Station. In the 1938–39 report the resistances and susceptibilities of eleven coffee species and varieties to these four strains are given in a table. The *robusta* and *liberica* types which showed field resistance to the disease also maintained their resistance in the laboratory. The resistant types when inoculated with the fungus show leaf flecking—this suggests that the resistance does not depend on any inability of the fungus to make an initial penetration of the leaf. The spread of the fungus strains in the field appears to be slow. Breeding for resistance to *Hemileia* is being continued. Studies on the growth and yield of individual trees were also made.

347. Salmon, E. S. 633.79:575(42.23)
**Twenty-fourth report on the trial of new varieties of hops.**
J. Inst. Brew. 1941 : **47** : 371–79.

Some of the new varieties suffered badly from drought, while Brewer's Gold and Bullion Hop flourished in the dry season. The richest old variety, Early Bird, was exceeded in preservative value by 11 new varieties. Nonsuch Hop (OB53) and its bud sport OM26 grown at East Malling were richer in preservative value than the richest sample of imported American hops obtainable and it is interesting that the bud sport OM26 was slightly richer than its parent variety.

Data are given on yields, resin contents and calculated preservative values of several new varieties. Emphasis is laid on the need for a revision of the marketing of hops so as to encourage the varieties of high preservative value.

## OIL PLANTS 633.85*

348. Mohammad, A. and 633.853.49:575
Sikka, S. M. 633.853.48:575
**Improvement of *toria* (*Brassica napus* L. var. *dichotoma* Prain) and *taramira* (*Eruca sativa* L.) by group-breeding.**
Indian J. Agric. Sci. 1941 : **11** : 589–96.

As pure line breeding is not practicable in these two self-sterile crops, group-breeding in which crossing between plants is encouraged but is restricted to desirable individuals only, is recommended. Of the several possible methods available for effecting this, the one which is considered to be most hopeful is the inter-crossing of two or more selected plants and their selected progeny, under controlled conditions, for several generations until the resulting plants are fairly uniform in respect of certain desired characters. The difficulty of inter-crossing large numbers of plants is overcome by rearing colonies of *Apis indica* bees inside voile cloth cages which are placed at flowering time over the plants selected for crossing.

In the case of *toria* growing under natural conditions it is stated that increased pod-setting and consequently increased yield can be obtained by supplementing the normal insect population present in the field with hive-bred bees. B. P. P.

* See also Absts. 307 and 332.

349. RAMANUJAM, S. 633.853.49:576.356.52:576.354.4
**A haploid plant in toria (*Brassica campestris* L.).**
Proc. Indian Acad. Sci. 1941 : **14** : Sect. B : 25–34.
A haploid plant found in a toria (*Brassica campestris*) progeny from open pollination is described. At meiosis the haploid normally formed 10 univalents but occasionally a bivalent with a single chiasma was formed. Dyads were formed by some pollen mother cells from restitution nuclei. A few pollen mother cells with the diploid chromosome number were also observed in the haploid. The haploid set a number of seeds under conditions of open and cross-pollination.

350. JOHN, C. M. and
NARASINGA RAO, U. 633.853.74:576.312.35
**Chromosome number of *Sesamum radiatum*, Schum and Thonn. Beskr.**
Curr. Sci. 1941 : **10** : 364–65.
The chromosome number of *S. radiatum* (seeds collected in Nigeria) was found to be $2n = 64$ as compared with $2n = 26$ for *S. indicum*.

351. RAMANUJAM, S. 633.853.74:576.312.35
**Chromosome number of *Sesamum prostratum* Retz.**
Curr. Sci. 1941 : **10** : 439–40.
The gametic chromosome number of *S. prostratum*, a wild species growing in India, was found to be $n = 16$.

352. MOHAMMAD, A. and
GUPTA, N. D. 633.853.74:581.45:575.11
**Inheritance of alternate and opposite arrangement of leaves in *Sesamum indicum* DC.**
Indian J. Agric. Sci. 1941 : **11** : 659–61.
In types of sesamum isolated in the Punjab, some have alternate and some opposite leaves. $F_1$, $F_2$ and $F_3$ results from crosses between different types show that the alternate arrangement is dominant and that a single pair of allelomorphs is involved.

353. MOHAMMAD, A. and 633.854.54:575.11.061.6
KHAN, A. R. 633.854.54:575.116.1
**Some breeding investigations on linseed (*Linum usitatissimum* L.) in the Punjab.**
Indian J. Agric. Sci. 1941 : **11** : 432–45.
Blue petal colour behaved as a simple dominant to white and was completely linked with blue anther colour and with flat petals and complete opening habit of flowers. Similarly white petal colour was completely linked with yellow anther colour, crimped petals and partial opening habit of flowers.
Two factors, *M* and *G*, were found to be responsible for the brown colour of seeds. *M* is linked with the flower colour factor *D* though not completely (cross-over value - about 7 per cent) while *G* is independent. B. P. P.

## RUBBER PLANTS 633.91

354. FORD, C. E. 633.912:575(54.8)
**Ceylon clones—IX (1940).**
Quart. Circ. Ceylon Rubb. Res. Scheme 1941 : **18** : 13–23.
A further report of the test tapping of Ceylon rubber clones (cf. "Plant Breeding Abstracts", Vol. X, Abst. 967). The results are given in five tables. Tables I and II give the yield records of the most promising clones, Table III gives a comparison of the yield of Ceylon clones with those of imported clones and Tables IV and V give the 1940 yield records for all clones at Nivitigalakele. There are also notes on the following clones Millakande 3/2, Millakande 1/1, Hillcroft 28 and Wagga 6278. Millakande 1/1 is not a good clone; Millakande 3/2 is now recommended for large scale planting; Hillcroft 28 gives a high yield but is rather susceptible to brown bast; and Wagga 6278 is also now approved for large scale planting.

355. MURRAY, R. K. S. 633.912:575(54.8)
**Report of the botanist and mycologist for 1940.**
10th Rep. Rubb. Res. Scheme Ceylon 1941 : 46–63.
In artificial pollinations MK.3/2 and HC.28 again failed as seed parents, and MK.1/3 proved to be pollen sterile. Self-pollinations have been included in the breeding programme. Test tapping of Ceylon clones has been continued. Trees which had been marked in 1939 as possibly resistant to *Oidium* infection appeared in 1940 to be just as susceptible as other trees.

356. MANN, C. E. T. 633.912:575(91)
**The work of the botanical division of the Rubber Research Institute.**
Rubb. Res. Inst. Plant. Bull. 1941 : No. 17 : 1–4.
A broadcast talk by the head of the botanical division of the Rubber Research Institute of Malaya. Mention is made of selection and breeding work with *Hevea brasiliensis*.

## NUTS 634.5*

357. LOCHRIE, J. V. 634.58:575(68.34)
**The groundnut (*Arachis hypogoea*).**
Swaziland Agric. Rev. Notes 1939 : No. 6 : 9–14. (Mimeographed).
*Inter alia* it is mentioned that early, small podded, bunch selections made at Bremersdorp have been tested against other varieties and the most successful strains have been bulked and distributed to farmers.

## PALMACEOUS AND OTHER TREE FRUITS 634.6

358. MENON, S. R. K. 634.61:581.162
**Notes on the fall of immature coconuts in Ceylon.**
J. Coconut Industr., Ceylon 1941 : **5** : 87–91.
The causes of immature nut-fall are classified as physiological, meteorological, pathological, predatory and genetical. The genetical cause is considered to be more of theoretical interest than of practical importance.

359. JACOB, K. C. 634.61:581.46
**A new variety of coconut palm (*Cocos nucifera* L. var. *spicata* K. C. Jacob).**
J. Bombay Nat. Hist. Soc. 1940 : **41** : 906–07.
Details are given of six palms which produce unbranched inflorescences. From the history of these palms it appears that the character is heritable. On account of the spike-like nature of the panicle in such palms there is not enough room for the development of a large number of nuts.

## VEGETABLES 635

360. FERNANDO, M. and UDURAWANA, S. B. 635.627–2.7–1.521.6
**The relative resistance of some strains of bitter-gourd to the cucurbit fruit-fly.**
Trop. Agriculturist 1941 : **96** : 347–52.
The fruit-fly (*Dacus cucurbitae* Coq.) has compelled the abandoning of cucurbits in certain market-garden areas in Ceylon. Five strains of bitter-gourd (*Momordica charantia* L.) were tested for resistance to the fly and for yield in the years 1938–41. The strain CD green rough was consistently the best in regard both to resistance to fruit-fly and yield.

361. HOFMEYR, J. D. J. 635.651:576.356.5:581.04
**The use of colchicine in horticulture, with special reference to *Carica papaya* L.**
Fmg S. Afr. 1941 : **16** : 311–12, 332.
Tetraploid papayas were obtained by treating the terminal buds of seedlings with aqueous solutions of colchicine. Descriptions are given of male and female tetraploid plants. The tetraploids have much broader fruits than diploids. Seed has been obtained from crosses between male and female tetraploid papayas.

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* See also Abst. 307 (Groundnut).

362. Bhaduri, P. N. 635.651:581.04
**A study of the effects of different forms of colchicine on the roots of *Vicia faba* L.**
J.R. Micros. Soc. 1939 : **59** : 245–76.

The effect of three different forms of colchicine—the chemically pure alkaloid, colchicine salicylate and crude corm and seed powder of *Colchicum autumnale* -on the root tips of *Vicia Faba* was studied. All three forms produced the same effect but roots revived better from the action of corm and seed powder than from the other two forms. Colchicine caused a collapse of the spindle mechanism and the formation of tetraploid cells. The minimum time of colchicine treatment and the minimum colchicine concentration necessary to produce the effects were determined.

363. Rangaswami Ayyangar, G. N. and Kunhi Krishnan Nambiar, K. 635.654:575(54.8)
**Lablab—the garden bean.**
Indian Fmg 1941 : **2** : 469–72.

Descriptions are given of six varieties—D.L. 259, 250, 692, 453, 244 and 279—of lablab selected at the Millets Breeding Station, Coimbatore. A new variety, D.L. 1428, has been obtained from a cross between a garden variety and a field variety. D.L. 1428 combines the quality of the pods found in the garden variety with the hardiness of the field variety.

364. Rangaswami Ayyangar, G. N. and Kunhi Krishnan Nambiar, K. 635.654:575.11.061.63
**Studies in *Dolichos lablab* (Roxb.) and (L.), the Indian field and garden bean—IV.**
Proc. Indian Acad. Sci. 1941 : **14** : Sect. B : 95–113.

Five types of localization of the seed coat colours black, chocolate and khaki in lablab are described—micropylar colour, caruncular patch, dorsal patch, marbled and eye patterns. These patterns are produced by the interaction of five factors, $K$, $C_p$, $D_p$, $M$ and $B_f$. The factor $K$ alone causes micropylar colour, the factors $K$ and $C_p$ together produce the caruncular patch pattern and the dorsal patch pattern is formed when the three factors $K$, $C_p$ and $D_p$ are all present. The factor $M$ produces the marbled pattern. The combined presence of $K$, $C_p$, $D_p$ and $M$ results in the eye pattern. The factor $B_f$ for buff seed coat also converts any of the above patterns into whole colour. There is also another factor pair, $S_p$ $s_p$, for even distribution of colour $v$ speckling of the two colours black and chocolate. Speckling is not found in buff and khaki seeds.

# Part II. Foreign.

## STATISTICS 519

365. DEMING, W. E. 519.24
**Some thoughts on statistical inference.**
J. Wash. Acad. Sci. 1941 : **31** : 85–92.

The author gives a general outline of statistical methods applied to scientific research and social enquiries conducted on scientific lines. He describes the relation between (*a*) Data or evidence accruing from an experiment or from an enquiry (*b*) The "prediction" the scientist may make from the data and (*c*) the degree of belief that may be attached to this prediction. [The component (*b*) is sometimes better described as the answer to a question put to nature or to society in form of an experiment]. The author warns against the mistake of confusing the variation in the data (which he calls precision) with the "accuracy" of the resulting "prediction" which is affected by a possible change in the conditions under which the particular experiment was carried out. Statistical control charts of mass-produced articles and certificates issued by the U.S.A. National Bureau of Standards are examined in the light of the theory. H. O. H.

366. FISHER, R. A. 519.24
**The interpretation of experimental four-fold tables.**
Science 1941 : **94** : 210–11.

This note is a reply to E. B. Wilson's article (see Abst. 368). The author points out that the test proposed by E. B. Wilson is based on an assumption (see Abst. 368) which differs from that on which his test (as well as the $\chi^2$-test and Yates' correction to the $\chi^2$-test) is based. This explains the discrepancies between the two criteria. The author restates the basic idea of his test which consists in judging the significance of a particular experimental result in a four-fold table by determining the relative frequency in the group of all other possible experimental results in which the total number of deaths is the same as the observed death rate (6 mice out of 12 in the example of the preceding abstract). This frequency does not depend on the "chance of death" on which no assumption is made. On the other hand the author shows that the assumption made by E. B. Wilson entails certain logical difficulties and he argues that the chance of death should not be assumed to be known unless the number in each group is very large. It is then that E. B. Wilson's test tends to agree with that of the author. H. O. H.

367. SYZRANTSEV, P. I. 519.24
**(The mathematical treatment of a small number of experimental data).**
Socialistic Grain Farming, Saratov 1941 : No. 2 : 163–82.

The author gives a method of calculating the coefficient of variation from the ratio of the mean deviation to the mean. The multiplier for obtaining the former from the latter is tabulated for values of $n$ from 3 to 40 after which it remains practically constant. This ratio is presumably calculated for a normal distribution so that some loss of accuracy is involved in the process.

Examples are given on the basis of comparative yield trials of the wheats Lutescens 062 and Local Poltavka, from which it was selected, of comparisons of two different method of determining the weight of a soil sample, and of the determination of the effectiveness of manuring of winter wheat.

368. WILSON, E. B. 519.24
**The controlled experiment and the fourfold table.**
Science 1941 : **93** : 557–60.

The author examines critically standard statistical methods of analysing controlled experiments which may be arranged in a four-fold table. The tests considered are:—K. Pearson's $\chi^2$-test, F. Yates' correction to $\chi^2$ and R. A. Fisher's "Exact Method" of testing the significance of four-fold tables. In terms of the author's example suppose that we are testing the potency of viruses A and B by injecting dosages into six mice each, and suppose that 5 of the mice receiving virus A die as compared with 1 dead mouse in group B. Is virus A more potent? The answers given by standard tests are deemed inaccurate as they differ from that given by an argument which the author calls the exact one. This test is based on the assumption that

the chance of death in both groups is known and equal to the observed proportion of dead mice in each group. This condition of equality between chance of death and observed mortality ratio is the very type of assumption which it is the aim of modern small sample theory to avoid. The mathematics given by the author is an interesting demonstration of the extent to which a criterion may depend on the assumptions on which it is based. H. O. H.

369. Hsu, T. H. 519.241.1
**Samples from two bivariate normal populations.**
Ann. Math. Statist. 1941 : 12 : 279–92.

It is sometimes of interest to test whether two correlation-coefficients, each calculated from a bivariate sample, are significantly different or whether their numerical difference is merely due to chance. R. A. Fisher's z-transformation of the correlation coefficient provides a simple approximate solution to this problem. Following Neyman's and Pearson's method of the likelihood ratio, the author derives exact tests under various hypotheses. The random sampling distributions of the derived statistics are in certain cases reduced to tabulated functions (Incomplete B function). H. O. H.

370. Wald, A. 519.241.1
**On the analysis of variance in case of multiple classifications with unequal class frequencies.**
Ann. Math. Statist. 1941 : 12 : 346–49.

The author is concerned with an analysis of variance in a multiple-classification of means, each obtained through averaging groups of different numbers of observations. For instance, if plants are grown on plots arranged in a randomized block experiment, the number of surviving plants will vary from plot to plot and the plot-mean of an attribute will therefore be based on a varying number of plants. Effective methods of analysis applicable under various conditions have been given by Yates, Snedecor, Brandt and others. The author contributes to the theory of the case where the differences in numbers are genuine effects of the experimental treatments and not accidental. The method used is a multiple analysis of covariance with artificial concomitant variates which has previously been used by M. S. Bartlett in similar problems. The result reached is, as yet, too complicated to be used in practice. H. O. H.

371. Young, L. C. 519.241.1
**On randomness in ordered sequences.**
Ann. Math. Statist. 1941 : 12 : 293–300.

The fitting of what are called regressions to data is a well known statistical technique, the best known type of regression being a straight line. Other types of regressions are known (e.g. growth curves of sigmoid character, or Mitchelich's law of diminishing returns). In some cases, however, the experimenter wants to test whether his data follow any regression but has no indication of its shape or kind. Tests for this purpose have been developed, the best known being Pearson's test for contingency. The author introduces a new statistic (which he calls C) designed to measure the amount by which an ordered series of observations differs from random distribution in the sense that it follows the trend of a curve. The statistic is akin to the correlation coefficient between consecutive observations in the sequence. Its random sampling distribution is investigated and tables for the test of significance are provided for the case of normal samples. H. O. H.

## BREEDING 575

372. Goodale, H. D. 575:633
**Progress report on possibilities in progeny-test breeding.**
Science 1941 : 94 : 442–43.

Though mainly concerned with animal breeding, the author throws out the suggestion that progeny test breeding might be applied to plants.

373. Hayes, H. K. 575:633
**Some illustrations of methods in plant breeding.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 1–17. (Mimeographed).

Crop plants are divided into four groups on the basis of their method of pollination: self-pollinated, often cross-pollinated, cross-pollinated and dicœcious. Breeding methods in the

first and third groups are described and illustrated. In self-pollinated crops the pedigree method is illustrated by the breeding of oats from crosses of Anthony and Iogold with Bond, the back-cross method by the improvement of Thatcher, especially in respect of resistance to leaf rust, by crossing with Hope and back-crossing twice to Thatcher.
Breeding methods with cross-pollinated crops are illustrated with reference to maize breeding, an account being given of the hybrid maize method and of the improvement of inbred lines, both by the convergent improvement method and by the pedigree method, similar in principle to that used for self-pollinated crops.
The value of genetical knowledge is emphasized throughout.

374. 575:633(41)

**Mobilizing seed power (from "Science in War", a Penguin Special, Harmondsworth/Penguin books, 1940,** p. 85 *seqq.*).

Chronica Botanica 1941 : **6** : 411–13.

The present state of work on varietal improvement in Great Britain is discussed and severely criticised, with reference to the war effort.

375. 575:633(47)

**The All Union Agricultural Fair.**

Chronica Botanica 1941 : **6** : 417–18.

*Inter alia* brief reference is made to several aspects of Soviet plant breeding shown at the fair, which was opened for the third year in 1941.

376. Maslennikov. 575:633(47)

**(30 years research and practical work of the Novyi Uren' Agricultural Experiment Station).**

Socialistic Grain Farming, Saratov 1941 : No. 2 : 62–68.

Among the achievements of the station there figure the production of improved varieties of millet, winter wheat (Ul'janovka), spring wheat (Lutescens 300 and others), lentils, peas, vetch and sunflower.

377. 575:633(72.94)

Rapport annuel exercices 1936–37 et 1937–38. **(Annual report for the financial years 1936–37 and 1937–38).**

Bull. Serv. Nat. Prod. Agric. Enseign. Rur., Haiti 1939 : No. 15 : Pp. 152.

**Cotton.**
The opinion is expressed that for conditions in Haiti it is essential to obtain by selection a type of indigenous cotton, much smaller than the existing ones, and characterized by rapid and uniform vegetative development and fruiting in order to combat the two weevils which attack annual cotton.

**Sesame.**
Selection for high oil content combined with uniform size and colour of the seed is being carried out with seed which has shown a variation in oil content from 52·5 to 53·7.

**Oil palm.**
In oil palm selection indigenous varieties have been included as well as a selected *tenera* variety from the Congo.

**Other oil plants.**
The oil content of seeds of *Sterculia apetala, Citrullus vulgaris* Shrad., *Hura crepitans, Datura stramonium, Jatropha curcas* was also determined. Comparative variety trials of the castor oil plant are also in progress.

**Groundnut.**
Selection has been proceeding with indigenous varieties under the direction of the Botanical Division since 1935 and a certain degree of uniformity in vegetative and fruiting characters has already been attained, judging from the records from 1,500 plants harvested separately and analysed to determine the yield and number of fruits per plant, etc. The oil yield of the best specimens varied from 46–54% with an average of 48%. Seed from progeny of the best individuals has been sown in plots for further selection.

Citrus growing is being developed, especially indigenous types.
Endeavours are also being made to promote the development of numerous other fruits, legumes and tropical crops of various kinds (including *Aleurites*, spices, kapok, sisal, tobacco) in the Republic.

378. 575:633(82)

Primera Reunión Argentina de Agronomía, Abril 1941. Resoluciones y resúmenes de los trabajos presentados. (**First Argentine Agronomy Meeting, April 1941. Resolutions and summaries of the works presented**).
Soc. Argent. Agron. B. Aires 1941 : Pp. 150.

The report contains the following references to plant breeding:—

*Burkart, A.* — *Sobre la existencia de razas silvestres de "Phaseolus vulgaris" y "Phaseolus lunatus" en el norte argentino.* (*The existence of wild races of P. vulgaris and P. lunatus in northern Argentina*). (*p. 52*).

Wild forms of both species, differing from the cultivated forms, have been found in humid valleys of the mountains of Tucumán, Jujuy and Misiones.

*Horovitz, S.* — *Luteomaculata, nuevo gen del cuarto cromosoma de maíz.* (*Luteomaculata, a new gene in the fourth chromosome in maize*). (*pp. 58–59*).

The gene causes extensive yellow patches on the leaves; it is recessive and designated *lu*. It is independent of *Tu* but linked with *la*, with 36·6% crossing-over. The position of *lu* is some 15 units to the left of *Ga*, thus:—

$$De_1\text{–}Lu\text{–}Ga_1\text{–}Ts_5\text{–}la\text{–}su\text{–}Tu\text{–}gl_3$$

Hence it lies in a region in which there were formerly no marker genes.

*Horovitz, S. and Marchioni, A. H.* — *Herencia de la resistencia a la langosta en el maíz "amargo".* (*Inheritance of resistance to locust in Amargo maize*). (*pp. 59–60*).

The experiments have shown Amargo maize to be resistant to infestation by the grasshoppers *Dichroplus arrogans* Stal. and *Scyllina variabilis* Bruner as well as to the locust (*Schistocerca paranensis* Burm.).
In crosses between resistant and susceptible the $F_1$ are susceptible though less so than the parent. The $F_2$ contained 1097 susceptible and 301 resistant plants. The back-crossing $F_1$ x Amargo gave 226 susceptible (or semi-susceptible) and 232 resistant. The gene for resistance is thus regarded as a simple recessive and designated *ag*, which has proved independent of *Bb* and *Lglg* in chromosome 2, *Tutu* in chromosome 4, *Plpl* in chromosome 5 and *Ogog* in chromosome 10. It is linked with *Pp* in chromosome 1, the crossing-over being approximately 20%. No correlation has been observed between resistance and any visible character such as pigmentation or pubescence. The resistance of Amargo is thought to be possibly related to that of *Tripsacum*.

*Horovitz, S., Marchioni, A. H. and Fisher, H. G.* — *Mejoramiento del maíz dulce para la industria del envasado. Aumento del contenido de azúcar.* (*Improvement of sweet corn for the canning industry. Increasing the sugar content*). (*pp. 60–61*).

A new sugary factor $su_3$ has been discovered in the local maize of the province of Corrientes in Argentina. It is in chromosome 6 with $su_2$ but on the left of *Pl*; in its presence the gene $su_1$ is converted from recessive to dominant. Grain of the constitution $Su_1\ su_1\ su_2\ su_3$ is wrinkled and when selfed segregates some super-rugose forms which have an uncommonly high sugar content, up to 13·80 as compared with 5·14 in ordinary $su_1$.

*Perak, J. T.* — *Número de cromosomas de algunas especies de "Hordeum" espontáneas en la Argentina.* (*Chromosome number of certain wild Hordeum species of Argentina*). (*p. 61*).

In *H. stenostachys* Godr., *H. compressum* Griseb., *H. pusillum* Nutt., var. *typicum*, *H. pusillum* Nutt. var. *euclaston* Stend. $2n$ was equal to 14; in *H. leporinum* L. and *H. jubatum* L. $2n = 28$.

*Salomón, E. S.* — *"Sorghum sudanense," tetraploide obtenido por colchicina.* (*Tetraploid S. sudanense obtained by colchicine*). (*p. 63*).

Two plants with $2n = 20$ were obtained and their progeny were found to be tetraploid too.

*Dellazoppa, J. G.* — *La uniformidad de las variedades seleccionadas.* (*The uniformity of selected varieties*). (*pp. 64–65*).

Numerous cases of out-pollination observed in autogamous plants in Uruguay are cited. Other varieties are mentioned which have been grown for 20 years or more without having suffered any change.

Excessive homozygosity is regarded as deleterious, since it is generally associated with a loss of plasticity. The Uruguayan wheat Litoral illustrates the advantages of a certain degree of impurity and also witnesses to the advantage of crosses between forms of widely different geographical origin.

*Etchecopar, J. A. and Sívori, E.* — *Algunos aspectos en el mejoramiento del girasol.* (*Some aspects of sunflower breeding*). (*pp. 66–67*).

The local types are very mixed and low in oil content, being altogether inferior to selections introduced from Russia. Mass selection, self-pollination and the creation of synthetic varieties are being tried as methods of improvement.

*Torres, A. C.* — *El mejoramiento del lino en Entre Ríos.* (*Linseed breeding in Entre Rios*). (*p. 69*).

The characters required in a good linseed for the province of Entre Rios are enumerated.

*Arzuaga, J. G. and Montes, A. D.* — *Resultado de las infecciones artificiales con "Ustilago tritici" en variedades y nuevas líneas de trigo.* (*Results of artificial infection with U. tritici in varieties and new lines of wheat*). (*p. 81*).

No immune and very few resistant varieties exist, and therefore breeding work is required.

*Vallega, J.* — *Comportamiento de algunas variedades de avena con respecto a "Puccinia coronata avenae" (Cda.) Erikks. y Henn.* [*Reaction of certain oat varieties to P. coronata avenae (Cda.) Erikks. et Henn.*]. (*p. 88*).

The variety I.E.I.A. 37.24/629 proved resistant to races 1, 55 and 56 but not to 45; Victoria and its hybrids were resistant to 1 and 45. By crossing these two types therefore it should be possible to breed forms resistant to all the Argentine races.

*Vallega, J.* — *Especialización fisiológica de "Puccinia coronata avenae" (Cda.) Erikkss y. Henn. en Argentina.* [*Physiological specialization of P. coronata avenae (Cda.) Erikkss et Henn. in Argentina*]. (*pp. 88–89*).

Four races have been found to exist.

*Vallega, J.* — *Una nueva raza de "Puccinia graminis tritici" (Pers.) Erikss. y Henn.* [*A new race of P. graminis tritici (Pers.) Erikss. et Henn.*]. (*p. 89*).

The new race, No. 189, is found in Peru and is the most virulent yet known.

379. Cross, W. E. 575:633(82)
Memoria anual den año 1940. (**Annual report for 1940**).
Rev. Industr. Agric. Tucumán 1941 : **31** : 5–106.

**Cotton.**

The most promising of the crosses appears to be Tucumán C1 x Acala Roger Improved. Improved selections have been obtained from Tucumán C1 and Lightning Express.

The experiments on treating seeds with colchicine have been continued and the variety collection maintained.

**Sugar cane.**

Reports are made on the behaviour of a number of imported varieties.

Earlier findings on the various mutations of P.O.J. 36 (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 314) have been confirmed. The white mutant of P.O.J. 213 has again proved much richer in sugar though lower in yield of cane; thus the white form yielded 925 kg. of cane per row, with a sugar content of 12·6% and the parent cane yielded 1,092 kg. with sugar content of 11·2%. No difference from the parent form could be detected in the white Tuc. 472, the striped Tuc. 407 and a supposed Brazilian mutant of P.O.J. 2714. The white Tuc. 385 seemed to be less rich in sugar than the striped form.

Among the seedlings, Tuc. 472 has continued to give excellent yields of cane rich in sugar; it is closely followed by Tuc. 472; this latter cane has yielded 1,360 kg. per row with a sugar content of 11·5%, compared with P.O.J. 36 with 894 kg. and sugar content 10·8%; this cane is very popular for chewing. Both canes are resistant to mosaic.

Tuc. 630 (H. 109 x Yellow Tip) has again done well and is being tried out in different localities.

Tuc. 1376 (Co.243 x Co.244) has maintained its position and tabular data are given showing its high yields of cane and sugar; also for Tuc. 1406, Tuc. 1111, Tuc. 1128 and others of the same parentage, which is the most successful yet tried.

Among the seedlings of P.O.J. 2878 good results have been obtained from Tuc. 1854 and especially from Tuc. 2611, which has yielded 1,170 kg. per row, with 12·4% sugar, as against 1,092 kg. with 9·5% for P.O.J. 36. Other promising seedlings of this cross are Tuc. 2613, 2622, 2634, 2645, 2683 and 2701.

Two of the seedlings of Co.213, namely Tuc. 3140 and 3142, are promising.

Several good hybrids have been obtained from the cross H. 31·626 x Co.205 and data are given showing their performance; also from the cross P.O.J. 2878 x a seedling of P.O.J. 234 and the cross H. 31·626 x H.32·8535.

The seedlings of all the other combinations have proved either inferior or very little superior to the standard P.O.J. 36.

A new series of seedlings, from the cross Tuc. 3919 x Tuc. 3889, is now under observation.

380. 575:633(92)
633.00.15(92)

COSTER, C.

Het werk van het Proefstation West-Java in 1940. (**The work of the West Java Experiment Station in 1940**).

Bergcultures 1941/: **15** : 1124–33.

This report includes some results obtained by the Station in the first half of 1941. In spite of the repercussions of the war in 1940 considerable progress was made in research, which was developed and extended thanks to financial support which made the provision of new laboratories and equipment possible. The Rubber Research Division of the Station became the Rubber Research Institute, being raised to the status of an independent institute for international rubber research, though the agricultural and technical research still remains in the hands of the various rubber experiment stations.

Several experimental plantations were also greatly extended for selection work and other research problems.

From the various investigations of the West Java Experiment Station the following results are of interest to plant breeders:—

**Tea.**

That the tea selection work has been effective is shown by the fact that the shoots on selected plants have developed far more lateral buds than the shoots of unselected plants. By selection, 60 promising new clones have been chosen and are now undergoing tests in a large number of trial plantations over the whole of the N.E.I. tea area. The difficulties of transporting buddings for such tests to estates as far away as Sumatra have been overcome. Hormonal treatment of root cuttings has been successful.

The importance of laying out seed gardens with high grade material of two or more clones is stressed and breeding work has now reached the stage when artificial crosses on a large scale are possible, thus providing basic material for further selection of clones. In addition such tests of seedling families indicate which clones should be grown in the seed gardens.

The effects of plucking methods and of density of planting on yield were studied.

**Cinchona.**

*Cinchona* hybridization has been conducted on a large scale and local trial plantations for various clones and seedling families are to be laid down at different *Cinchona* regions in Java and Sumatra.

It has also been possible to establish a Plant Advisory Service for this crop. The first lot of grafting material of the new clone K.P. 19, which considerably exceeds Tjibeureum 5 (the Station's best clone so far) in yield was distributed. Three new clones have also similarly surpassed Tjibeureum 5 and a small amount of grafting material should soon be available for distribution. Artificial pollination of Tjibeureum 5 by G.A. 22 appears to have been a great success and a large amount of seed was distributed.

At the beginning of 1941 a number of crosses of high grade clones were made; these should be useful for estates where seedlings are grown and also as a basis for further breeding.

In co-operation with the Institute for Plant Diseases research is in progress to obtain *Cinchona* clones that are more resistant to *Phytophthora* infection. Grafts on *succirubra* stocks, which are more resistant, are recommended as preferable to seedlings for reclaimed land.

**Rubber.**

Closer co-ordination between the three experiment stations in regard to rubber improvement is considered desirable; a common programme of hybridization and trials has been adopted and agreement has also been reached with the Avros General Experiment Station providing for an exchange of promising clones not yet commercially available. An exchange of planting material has similarly been arranged with Ceylon and Malaya.

Rubber breeding is being conducted on a more extensive scale, the main line of work being the hybridization of high grade clones, and the selection of superior new clones from the seedling families thus obtained. In this connexion co-operation with the other rubber experiment stations in south-eastern Asia has been of value and in 1940 with 15 families about 30,000 artificial crosses were made and in one experimental plantation of about 1,000 clones derived from this material 15 clones worth multiplying have been found after a Hamaker tap done at $3\frac{1}{2}$ years of age. Four other promising clones had to be rejected owing to undesirable secondary characters.

A large number of commercial and unreleased clones were tested in the various local experimental plantations and the general result shows that none has surpassed Tjirandji in productivity, though some of the superior clonal seedlings have shown remarkable yields (see also Abst. 560).

It is recommended that stocks for rubber trees should be drawn from good clonal seedlings or (according to Avros) from *Spruceana* hybrids.

The seed nurseries on land reclaimed for scientific purposes at various places in Java and Sumatra give promise of very good seed in the near future. As the time and mode of flowering of the different clones showed great variation, the genetic composition of the seed harvested at various times will also differ greatly.

381. Huitema, W. K. 575:633(92)
Het landbouwkundig onderzoek bij overjarige cultures, in het bijzonder bij eenige nieuwe handelsgewassen. (**Agricultural research in regard to perennial crops, in particular some new commercial plants**).
Bergcultures 1941 : **15** : 818–25.

Productivity, yield of copra and the best time for harvesting are the main problems in coconut selection in Java. Selection has resulted in 17% of the trees on the plantation at Pasir Ajoenan (Bantam) producing 84 nuts per tree at seven years of age. At Mocktihardjo a large number of mother trees are being tested that were obtained from crosses of native and imported trees. The most promising of the latter, which were much superior in yield, came from the Congo and Togo.

In addition to the foot rot resistant form of *Piper nigrum* ("lada belantoeng"), two more resistant forms have been obtained.

Some gambir varieties have been selected out with tannin content of 60% calculated from the dry leaf.

Serch selection begun in 1936 is being assisted by the collection of large numbers of forms from various centres of cultivation; some forms have a citronellal content of 56%. About 150 clones are now being tested.

Research on shade trees concerns mainly dadap and lamtoro. Out of 50 varieties of the former belonging mainly to five botanical varieties, one, "dadap solo," has been selected on account of its good growth, and resistance to diseases and pests, absence of spines and seeds, light foliage which is shed gradually and gives excellent fall of leaves. (Cf. "Plant Breeding Abstracts", Vol. XI, Abst. 315).

A very satisfactory lamtoro type has been evolved by hybridization (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 479).

The economic need for increasing the numbers of different commercial crops in the Netherlands East Indies has been recognized and more than 80 new crops have now been included in the research programme of the Indies thanks to the work of the committee established in 1933 to promote the cultivation of commercial crops.

*Derris* selection involving 4,000 analyses of material from various parts of the Archipelago produced 181 clones with a rotenone content of from 9–14% and an ether extract of 18–31% and from these 40 are being multiplied for variety trials of the rotenone content, root yield, resistance to diseases and pests and other characteristics under varying conditions of soil and climate.

Pyrethrum plants have been imported from the U.S.S.R., Kenya and Japan to discover whether they can be grown for insecticide production in high lying dry districts in the N.E.I. Some good results have already been obtained at Dieng, Tosari and Tawangmanggoe and selection has now been started.

Two other promising sources of insecticides are *Mundulea suberosa* (from the root and bark) and *Pachyrhizus angulaties* (from the seed).

Seed of two *Aleurites* species has been introduced into the N.E.I., but *A. Fordii* has not done well in the N.E.I. and *A. montana* gave very unequal results. About 50 mother trees with high oil (56–60%) and/or elaostearin (75–78%) content have been selected for testing as clones and seedlings and a central selection plantation has been established at Bodja and trials in regions differing in soil and climate are also planned.

Other plants yielding non-volatile fats and oils that are now being investigated are: *Perilla ocymoides, Licania rigida, Macadamia ternifolia, Caryocar nuciferum, Shorea stenoptera, Lecythis* sp. and *Orbignya speciosa.*

Research is also in progress on the development of the production of *Eugenia aromatica, Cananga odorata, Pelargonium Radula* and *Clausena anisata.* Preliminary investigations are also being made on species of *Cinnamomum* and *Ocimum* and *Melaleuca leucadendron* L. and also on *Bixa Orellana* which is used for dyeing purposes. The bixine content has been found to vary between 7–8% in the best of the different selections obtained from three clones received from Tasikmalaja in 1923. It is hoped that the quality of the anatto may be improved by selection.

Intra and interspecific crosses of *Amorphophallus* species are being made to improve the quality of this industrial plant of many uses.

The possibility of developing the cultivation of Manilla hemp in Java is receiving attention and material for selection is being collected. Trial plantations of *Boehmeria nivea* have also been laid down and specimens of different varieties are being assembled in a plantation for observation.

The possibilities of the following medicinal plants are also being investigated: *Melaleuca alternifolia,* Chaulmogra, *Orthosiphon grandiflorus, Desmodium gangeticum* and *Strobilanthes crispus.*

382. Dias, B. P. 575:633:519.24
Método de seleção das "raças ecológicas". (**Method of selection of ecological races**).
Rev. Agron., Brasil **1941** : **5** : 390–92.

The use of distribution frequencies for selecting "pure lines" with the highest yielding capacity is illustrated.

383. Paguirigan, D. B. 575:633:575.125(91.4)
**The utilization of first filial generation hybrids in crop improvement in the Philippines.**
Proc. 6th Pacific Sci. Congr. **1940** : **4** : 709–16.

The yield and quality of tobacco, sugar cane, maize and abaca (Manila hemp) have been

improved in the Philippines by the utilization of $F_1$ hybrids. $F_1$ tobacco hybrids between a type grown in the open and a shade variety are now grown commercially in the open on one farm. Descriptions are given of the parent varieties—Simmaba, Vizcaya and Ilagan Sumatra —and of two hybrids. Two outstanding sugar cane hybrids—Alunan (from the cross Java 247 x Badila) and P.S.A.14 (from the cross P.B. 119 x C.A.C.87)—are now widely grown. Descriptions are given of these six canes. A strain of Manila hemp has been selected from the cross Putian x Maguindanao and the strain combines the resistance of Putian to the bunchy-top disease with the high yield of excellent quality fibre of Maguindanao.

384. Schwarze, P. 575:633:578.08:581.192
Die Verwendung der refractometrischen Fettbestimmung zu Serienuntersuchungen an Zuchtmaterial. (**The application of the refractometric method of fat determination to serial investigations of breeding material**).
Züchter 1940 : **12** : 164–67.
Details are given of the apparatus and method by which it is claimed determinations can be made in a few minutes at a much lower cost than in the other methods. Further details are to be given in a concluding article. R. M. I.

385. Castle, W. E. 575–181
**Size inheritance.**
Amer. Nat. 1941 : **75** : 488–98.
The inheritance of size in animals is discussed. It is suggested that the multiple factor hypothesis in its original and simplest form is an inadequate explanation of inheritance of body size in mammals. It is pointed out that the influences of size genes are unequal and do not act uniformly in one and the same direction. Experimental studies on the inheritance of body size in mice are described in some detail. In animals the mother has a greater influence than the father on the size of offspring. Part of this influence is due to the cytoplasm of the egg. Finally the mode of action of size genes is considered.

## GENETICS 575.1

386. Kihara, H. 575.1
(**What kind of study is the geneticist engaged in?**)
J. Insur. Med., Japan 1940 : **39** : No. 2.
A report of a lecture on the development and achievements of plant and animal genetics, illustrated by reference to the outstanding contributions of geneticists of the eastern and western hemispheres.

387. 575.1:061.3
**Russian contributions to the 1939 Genetics Congress. A. Plant Genetics.**
American Documentation Institute, Document 1563.
The American Documentation Institute has made available as microfilm or as photoprints the papers (or their summaries) which were to have been read by the Russian delegates at the Seventh International Genetical Congress at Edinburgh, 1939. There are eleven papers in the Plant Genetics section (A.D.I. Document 1563). Photoprints of these papers are on file at the Bureau. The eleven papers are:—

*Karpechenko, G. D. Cytogenetics in the service of plant breeding.* (*Abst.*).
A number of achievements of cytogenetics which have proved to be of direct practical application in breeding work are mentioned. These include the perennial amphidiploid hybrid between durum wheat and perennial rye, partial amphidiploids which are perennial between *Triticum durum* and *Agropyron intermedium*, fertile tetraploid geraniums from sterile forms, and hybrids between *Aegilops ventricosa* and *Triticum dicoccum* (these hybrids are immune to all three forms of rust, are fertile, form 21 bivalents at meiosis, and cross readily with *Triticum vulgare*). The non-crossability of species may also be overcome by producing tetraploids. Several characteristics of autotetraploids which may be of use to the breeder are mentioned.

*Koltzoff, N. K.* — *On the methods of artificially inducing polyploids by treatment with colchicine.* (*Abst.*).

The action of colchicine solutions on the roots of vetch ($2n = 12$) was investigated. Tetraploid and octaploid cells were produced and in some roots more than 1,000 chromosomes were seen in some cells. The effect of concentration and time of treatment on the percentage of polyploid cells produced was also investigated. The effectiveness of colchicine treatment varied but little for concentrations between 0·2% and 0·0012% (or even 0·0006%). The weaker the solution, the less were its poisonous effects on the roots.

*Kostoff, D.* — *Relation, degrees and phylesis of certain Nicotiana species.* (*Abst.*).

This paper appears to be similar to one which has been previously abstracted (see "Plant Breeding Abstracts", Vol. XI, Abst. 430).

*Kostoff, D.* — *Studies on atypical growth in plants.* (*Abst.*).

It is suggested that plant galls (induced by various parasites or chemicals) and non-parasitic hereditary plant tumours (such as are formed by *Nicotiana* hybrids) correspond to inflammatory outgrowths and cancerous outgrowths respectively in animals. The most active cancerogenic agents, however, do not induce atypical growths in plants and acenaphthene, which induces atypical growths in plants, has no effect on animals.

*Mostovoj, K. I.* — *Cases of constitutional sterility of plants.* (*Abst.*).

From crosses between hooded barleys and a barley which possessed an unusually high number of internodes and an ability to branch along the entire length of the culm (even in the ears) segregates have been obtained which had a tuft of shoots in place of the ears. These plants could only be propagated by rooting these ear tufts. Similar plants have been found in white and red clovers. The bearing of these results on morphological theories is considered and it is suggested that every plant has a structural ability to produce an unlimited number of internodes.

*Rozanova, M. A.* — *Significance of amphidiploidy and autopolyploidy for problems of phylogeny.* (*Abst.*).

It is pointed out that the phenomena of amphidiploidy and autopolyploidy are of great importance in solving problems of phylogeny. The existence of autopolyploid species and races has been found by the author and her associates in *Briza media* ($2n = 28$), *Agrostis Trinii* ($2n = 28$), *Lathyrus palustris* ($2n = 42$) and in *Rubus sachilinensis* Levl. ($2n = 28$). The study of the distribution of polyploid species in the Pamir, Altai and Caucasian mountains has shown that different genera react differently as regards the formation of polyploid species.

*Rybin, V. A.* — *The role of interspecific hybridisation in the polymorphism of Prunus spinosa L.* (*Abst.*).

The blackthorns in the valleys of the Belaya and Shuntuk rivers (Krasnodar region, North Caucasus) show an unusual diversity of forms. It was found that 17 specimens which differed considerably from typical *P. spinosa* had a chromosome number of $2n = 24$ as compared with $2n = 32$ for *P. spinosa* and $2n = 16$ for *P. divaricata*. These forms were also sterile. Artificially produced hybrids between *P. spinosa* and *P. divaricata* resembled closely the aberrant forms of wild blackthorn. It is therefore suggested that the unusual diversity of forms of blackthorns in the Belaya and Shuntuk valleys is due to natural hybridization between *P. spinosa* and *P. divaricata*.

*Sveshnikova, I. N.* — *Significance of the genus Vicia for the study of form evolution through the method of comparative cytogenetical analysis of species.* (*Abst.*).

The evolution of the fodder vetch (*Vicia sativa*) and its wild relatives (*V. amphicarpa*, *V. angustifolia* and *V. macrocarpa*) has been studied by both genetical and cytological methods and it is suggested that *Vicia* is very good material for such work. The inheritance of quantitative characters in the hybrids has also been studied (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 149). A genetical study of ecotypes of the various geographical races of *V. sativa* is also being made. Finally all these studies are being correlated with the selection of new forms for various regions of the U.S.S.R.

*Sinskaya, E.* — *Composition of natural populations of higher plants.* (*Abst.*).

It is pointed out that every species consists of a system of ecotypes and that climatypes (large ecotypes) of wild plants are assemblages of the smaller ecotypes which are found in the various types of small habitats in a given climatic region. The constitution of ecotypes, their part in the evolutionary processes taking place in plant populations and the changes in the ecotype constitution of populations corresponding to changes in the environmental conditions are discussed with special references to grasses and leguminous forage plants.

*Volotov, E. N.* — *On the production of polyploids in the poppy (Papaver somniferum L.) under the action of colchicine.* (*Abst.*).

Cf. Abst. 545 in this issue of "Plant Breeding Abstracts" for the production of tetraploids. In addition it is stated in this paper that two haploids have been found in the progeny of diploids.

*Zhebrak, A. R.* — *Experiments on obtaining amphidiploids in wheat.* (*Abst.*).

Amphidiploids were obtained by colchicine treatment of the two $F_1$ hybrids, *Triticum durum* x *T. Timopheevi* and *T. durum* x *T. monococcum* (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 119, and Vol. XI, Abst. 666).

388. Kerkis, J. J. and Liapounoff, A. A. — 575.1:519.24

**Segregation in hybrids.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 47–50.

The authors extend Kolmogoroff's (see Abst. 389) mathematical treatment of 3 : 1 ratios for cases in which the viability of the two classes is not equal. Data for 329 $F_2$ families containing 75,436 flies are examined. The ratio of dominants to total flies was 3·09 : 4·09—a quite good approximation to Mendel's ratio of 3 : 4. The calculations, however, show that there is a small but significant deficiency of recessives. In a footnote Kolmogoroff replies to criticisms of his paper by Lysenko and Kolman.

389. Kolmogoroff, A. N. — 575.1:519.24

**On a new confirmation of Mendel's laws.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 37–41.

It is pointed out that a statistical analysis of deviations in small families from the exact 3 : 1 ratio offers a method of verifying the Mendelian concept of character segregation. It is shown that no closer approximation to the mean value of 3/4 for the ratio progeny showing the dominant character: total number of progeny could be expected in individual families with the given sizes of family for data obtained by N. I. Ermolaeva. It had been suggested by Ermolaeva herself that these data disproved Mendel's theory.

390. Camara, A. de Souza da — 575.1:633(47) 575.3

Genética e selecção. (**Genetics and selection**).
Rev. Agron. Lisboa 1939 : **27** : 410–21.

Camara, A. de Souza da
A genética continua a ser atacada.
(**Genetics continues to be attacked**).
Ibid. 1940 : **28** : 330–32.

An outline is given of the genetics controversy in the Soviet Union. The author admits the desirability of conducting breeding operations in the best possible conditions of growth; and that an absolutely pure line is never attained in practice. Hence the possibility of effecting an improvement in an existing variety by selection or by intravarietal crossing is admitted on purely genetical grounds. Owing to the heterozygosity of most experimental material it is conceded that the nature of the environment may influence the results of selection, but the weight of experimental evidence against the direct inheritance of acquired characters is regarded as too great to be readily discounted. With regard to vernalization, it is pointed out that heat and cold treatment may well result in mutation, which may be the cause of some of the hereditary results described.

It is further pointed out that deviations from simple Mendelian ratios are frequently found to have some clear genetical or cytological cause and do not in themselves refute the whole science of genetics.

391. GRANER, E. A. 575.182
O citoplasma na hereditariedade. (**The cytoplasm in inheritance**).
Rev. Agric. S. Paulo 1941 : **16** : 481–86.
The author refutes statements by S. de Toledo Piza jun. (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 80) to the effect that geneticists have ignored the role of the cytoplasm.

392. NAVASHIN, M., GERASSIMOVA, H. and BELAJEVA, G. M. 575.24:581.02
**On the course of the process of mutation in the cells of the dormant embryo within the seed.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **26** : 948–51.
An account of experiments begun in 1933 on the influence of temperature and humidity on mutation in *Crepis tectorum* and *C. capillaris*. The investigation showed that (1) after 1000 days of storage the proportion of mutations in the seed increased rapidly; (2) the two species—*capillaris* an annual and *tectorum* a winter type which germinates immediately after maturation of its seed—differed in loss of viability and in the amount of mutation after a period of 300 days.
Under experimental conditions in which temperature fluctuations were very slight and the relative atmospheric humidity showed only very regular seasonal changes, the mutation process was accelerated as compared with seed stored under ordinary conditions. This is attributed to the increased humidity in the storage basement as compared with an ordinary room.
An argument is also put forward refuting Heribert Nilsson's view that accumulation of mutations should be explained as a result of selective mortality.

393. STUBBE, H. and WETTSTEIN, F. von 575.242:576.12
Über die Bedeutung von Klein- und Grossmutationen in der Evolution.
(**On the significance of small and large mutations in evolution**).
Biol. Zbl. 1941 : **61** : 265–97.
While the mutations concerned in evolution are usually thought of as small and numerous, the possibility has also to be considered that large mutations also play a part, giving rise to forms with wide systematic differences and without intermediate forms. The authors discuss this problem in some detail, with special reference to mutations in *Antirrhinum majus* producing changes analagous to the differences between *Antirrhinum* and other genera of the Scrophulariaceae, e.g. reduction in number of stamens.

394. MENDIOLA, N. B. 575.247:581.165
**Behaviour of some hidden bud variations.**
Philipp. Agric. 1941 : **30** : 439–64.
Observations were made on the variations found in the progenies obtained by vegetative reproduction of nine species of plants. The variations observed included the colour of the grains and the height of plants in rice, the number of bunches per stem in bananas, the smoothness or curliness of leaves in cassava and the presence or absence of variegated leaves in marang (*Artocarpus odoratissima*) and in the squash, *Cucurbita maxima*. In the rice variety Hambas two setts out of five obtained originally from one hill grew into dwarf plants. These dwarf plants were grown on for three or more generations by vegetative propagation. In nine cases the dwarf plants in the third asexual generation produced plants normal in height but possessing shoots showing dwarf characteristics. In the other ten cases only dwarf plants were produced in the third and fourth asexual generations. It is suggested that these results show that in the dwarf plants there was hidden variation for normal height as well as for dwarfness. The other variations observed behaved in a similar manner to that described for dwarfness in rice. In the discussion the significance and importance of bud variations are considered.

395. WRIGHT, S. 576.12:576.356.2
**On the probability of fixation of reciprocal translocations.**
Amer. Nat. 1941 : **75** : 513–22.
It is shown that the fixation of reciprocal translocations can hardly occur under exclusive sexual reproduction except in a species in which there are numerous isolated populations that pass through phases of extreme reduction in numbers.

396. MORRISON, G. 576.16:575.2
**Origin of species and varieties.**
Seed World 1941 : **50** : No. 8 : 10–11, 34–35.
This article is part III in a series on rudiments of botany for seedsmen. Chromosomes, genes, mutations and polyploids are briefly discussed.

## CYTOLOGY 576.3*

397. BOGYÓ, T. P. 576.356.5
A poliploida szerepe a fajok kialakulásában és elterjedésében különös figyelemmel a növénynemesitésre. (**The role of polyploidy in the origin and propagation of species with special regard to plant-breeding**).
Dolgozatok a M. Kir. József Nádor Müszaki és Gazdaságtudományi Egyetem Mezögazdasági Növénytani Intézetéböl, Budapest 1941 : No. 7 : Pp. 70.
In this general review of polyploidy the author concludes that the plant breeder need expect no miracles from its application. Its most useful application he considers to be the production of fertile hybrids (allopolyploids).

398. FAGERLIND, F. 576.356.5:576.354.46
Konstanz und Syndeseverhältnisse der Polyploide. (**Constancy and syndesis in polyploids**).
Chronica Botanica 1941 : **6** : 320–21.
The newly formed interspecific polyploid is generally considered as a type built up by the true addition of the genoms of the original types. This, however, does not hold if the original parents are allogenomic, which probably explains why many tetraploid species vary so much. The result of chromosome doubling in a hybrid between two species is often constant but segregation is known to occur. An allotetraploid must be constant but different behaviour is to be expected from interspecific polyploids that are more or less autopolyploid. Here the possibility exists of inter- or intra-specific combinations and such hybrids are rarely constant. In an interspecific autopolyploid, crossing-over between specifically different chromosomes is possible and by this means new chromosome types may be created.
As a result of interspecific syndesis, a segmental interchange between the chromosomes may occur leading to the development of secondary types which lack certain chromosome parts necessary for fertility. This may account for some of the observed sterility phenomena.
R. M. I.

399. 576.356.5:581.04
**Sulfa drugs potent in plants.**
Seed World 1941 : **50** : No. 7 : 36–37.
Reference is made to work by H. P. Traub at Beltsville, Maryland, showing that sulphanilamide induces polyploidy in plants.

400. GYÖRFFY, B. 576.356.5:581.04
Die Colchicinmethode zur Erzeugung polyploider Pflanzen. (**The colchicine method for the production of polyploid plants**).
Züchter 1940 : **12** : 139–49.
The literature on the induction of polyploidy by means of colchicine is reviewed and a list is given of the polyploid plants so produced. Arranged according to families, 117 plants are included in the list with the names of the producers. R. M. I.

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* See also Abst. 387.

401. Shmuck, A. and
Gusseva, A. 576.356.5:581.04
**Methoxyl derivatives of benzene and naphthalene studied with regard to their polyploidogenic action on plants.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 639–41.

Shmuck, A. and
Gusseva, A.
**Activity of polyploidogenic compounds as influenced by hydrogenation.**
Ibid. 1941 : **30** : 642–43.

In the first paper the authors suggest that the "polyploidogenic activity" of an aromatic compound depends upon the presence and position of methoxyl groups within its molecules. They tested the action of a large number of methoxyl derivatives of benzene and naphthalene on wheat seedlings and found that only a small number of such derivatives showed polyploidogenic activity. In the second paper it is shown that both colchicine and hydrocarbons with polyploidogenic powers lose such powers when they are hydrogenated.

## SEXUALITY 577.8

402. Hall, H. F. 577.8:001.4
**A note on terminology regarding intersexes.**
J. Hered. 1941 : **32** : 309, 314.

The following terms are defined—hermaphrodite, gynandromorph, freemartin, monoclinous, diclinous, monoecious and dioecious—and it is suggested that the present lack of uniformity in using these terms often confuses students of genetics.

## BIOLOGICAL TECHNIQUE 578

403. Overbeek, J. van,
Conklin, M. E. and
Blakeslee, A. F. 578.08:581.481
**Factors in coconut milk essential for growth and development of very young *Datura* embryos.**
Science 1941 : **94** : 350–51.

It was found possible to grow young *Datura* embryos, taken from seeds only 11 days after pollination and possessing only small cotyledon primordia, *in vitro* by adding coconut milk to the medium. It is stated that, although embryos isolated from mature or nearly mature seeds have often been grown *in vitro*, no success with very young embryos has been previously reported.

404. Kerns, K. R. 578.6
**Pasternack's paraffin method modified for plant tissue.**
Stain Tech. 1941 : **6** : 155–56.

A rapid method for preparing paraffin sections of plant material. Root tip chromosome counts can be made approximately three hours after taking the root rips.

405. Conn, H. J. 578.65
**Progress in the standardization of stains. No further certification of gentian violet.**
Stain Tech. 1941 : **6** : 141–42.

The American Stain Commission for Certification will no longer certify any dye under the name "gentian violet". Gentian violet is usually a mixture of crystal violet (hexa-methyl pararosanilin) and methyl violets. European gentian violets are usually methyl violets. As a substitute for gentian violet, the following recommendation is made—"Users should specify crystal violet for bacteriological work, and for histological work where a deep-blue violet is required; but should order methyl violet 2B in histological procedures where a reddish shade is called for".

406. Semmens, C. S. and
Bhaduri, P. N. 578.65:576.312.315
**Staining the nucleolus.**
Stain Tech. 1941 : **16** : 119–20.
A staining schedule using a combination of leuco-fuchsin and light green for staining nucleoli in paraffin sections is given. The new schedule does away with the need for any special treatment to avoid the stripping off of serial sections from the slides which occurs in a previous schedule given by the authors.

407. La Cour, L. 578.65:576.312.32
**Acetic-orcein : a new stain-fixative for chromosomes.**
Stain Tech. 1941 : **6** : 169–74.
It is claimed that the new acetic-orcein method, which is equally effective with fresh and permanent preparations, is superior to the aceto-carmine method in two respects—the staining is more easily regulated and with the new method there is little or no retention of stain by the cytoplasm. Details are given of methods of staining using acetic-orcein for the preparation of temporary slides (anther or testis), macerated root tips, salivary glands of *Drosophila* and of *Sciara* and for permanent preparations. Orcein can also be substituted for carmine in Zirkle's gelatin combination.

## BOTANY 58*

408. Turrill, W. B. 58.006(42.21)
**The centenary of the Royal Botanic Gardens, Kew, April 1, 1941.**
Chronica Botanica 1941 : **6** : 414–17.
A brief history of the gardens is followed by an account of their work and notes on the activity of past and present workers there.

409. Luyet, B. J. and
Gehenio, P. M. 581.036.5:632.111
**The mechanism of injury and death by low temperature. A review.**
Biodynamica 1940 : **3** : No. 60 : 33–99.
This review is divided into two chapters—the action of cold without ice formation and the action of cold accompanied by ice formation. It is the second of these chapters which might be of interest to plant breeders. The headings of the sections of this chapter are—theory attributing death to a mere withdrawal of energy, theory attributing death to the attainment of a minimal temperature, theory attributing death to mechanical injury, theory of death by too rapid thawing, theory of death by dehydration, and theory of death by various physiological, physical or chemical alterations.

410. Overbeek, J. van,
Conklin, M. E. and
Blakeslee, A. F. 581.163:577.17
**Chemical stimulation of ovule development and its possible relation to parthenogenesis.**
Amer. J. Bot. 1941 : **28** : 647–56.
Attempts were made to produce parthenogenetic seeds in *Datura* and *Melandrium* by treating the ovaries with auxins and other growth substances. It was hoped by this means to obtain haploid plants. However, only parthenocarpic fruits with well-enlarged placentae and ovules of increased size, which develop seed coats and nucellus but no embryo, were obtained. No division of the egg nucleus was observed after any treatment. A working hypothesis of the mechanism of the development of fruit, seed and embryo is given.

411. Zimmerman, P. W. and
Hitchcock, A. E. 581.163:577.17:635.64
**Formative effects induced with β-naphthoxyacetic acid.**
Contr. Boyce Thompson Inst. 1941 : **12** : 1–14.
Amongst other things it is suggested that β-naphthoxyacetic acid has, compared with other

* See also Abst. 387.

growth substances, several advantages for the practical production of seedless tomatoes and possibly of other fruits—it is easy and cheap to produce and there is no need to emasculate the flowers before spraying.

412. Schwarze, P. 581.192:578.08
Ein neuer Weg der Vorbehandlung des Materials für die refraktometrische Fettbestimmung in Zuchtmaterial. (Fettbestimmung in Zuchtmaterial, 2. Mitteilung). [**A new way of pretreatment of material for refractometric determination of fat in breeding material. (Fat determination in breeding material, 2nd communication)**].
Züchter 1941 : **13** : 184–91.

In the method described the meal to be extracted is shaken with N/10 hydrochloric acid, pepsin and small stones at a temperature of 36 40° C in the presence of a measured amount of benzine. The benzine is separated by centrifuging and the oil content is estimated by means of a refractometer. Accurate results can be obtained from as little as 0·25 grm of meal, though 2 grms were more often used. In an 8-hour day 80–90 determinations can be made.

413. Stebbins, G. L. (jun.) 581.6:633:576.354.4
**Apomixis in angiosperms.**
Bot. Rev. 1941 : **7** : 507–42.

The aim of this review is partly to revise and enlarge the review of Rosenberg (1930) on apomixis and partly to show the connexion between the problems of apomixis and other major problems. The review is divided into five parts—terminology and description of phenomena; evidence from apomixis as to the nature of meiosis; apomixis and the alternation of generations; hypotheses as to the cause of apomixis; and apomixis in relation to species differentiation and plant distribution: the agamic complex. There are about 160 references in the bibliography.

414. Parodi, L. R. and
Pastore, A. I. 631.524(82)
Géneros de plantas cultivadas representados en la flora indígena de la República Argentina. (**Genera of cultivated plants represented in the indigenous flora of the Argentine Republic**).
Physis, B. Aires 1939 : **18** : 255–68.

Some of the wild species akin to cultivated plants may serve as hosts for parasites of the cultivated forms; or may cross-pollinate, as in the case of the bitter gourd *Cucurbita Andreana* Naud. A list of the wild relatives occurring in Argentina is given in the present article, with indications of the districts in which they occur.

## PLANT DISEASES AND PESTS 632

415. Moulton, F. R. (Editor) 632:575.1
**The genetics of pathogenic organisms.**
Publ. Amer. Assoc. Advanc. Sci. 1940 : No. 12 : Pp. 90.

This symposium contains the following papers of interest to plant breeders:—

*Stakman, E. C.* *The need for research on the genetics of pathogenic organisms.* (*pp. 9–17*).

The author discusses and illustrates the need for a knowledge of the genetics of pathogenic organisms to ensure that the correct conclusions are drawn from experiments on, for example, changes in virulence.

*Kunkel, L. O.* *Genetics of viruses pathogenic to plants.* (*pp. 22–27*).

Mutation is discussed with special reference to tobacco mosaic virus. This and other plant viruses produce unlike progeny with a rather high frequency and the relative constancy of the disease, tobacco mosaic, is apparently due to the constancy of the environment, which favours the like progeny at the expense of the unlike. Most of the variants of tobacco mosaic cannot be maintained through successive transfers without change, and sooner or later are replaced by forms producing symptoms similar to or identical with tobacco mosaic. The mutants produce symptoms which are often extremely different from tobacco mosaic, but so far none have been transmitted to a plant immune from tobacco mosaic. All experimentally isolated

strains of tobacco mosaic virus cause necrotic primary lesions and no general infection in *Nicotiana glutinosa*. The ability of this host to restrict infection is governed by a single gene which can be transferred by hybridization. The same effect can be caused by a change in the virus, for Jensen's No. 14 strain of tobacco mosaic virus produces, in the absence of the *N. glutinosa* gene mentioned, the same type of lesions as are produced by the ordinary virus in the presence of the gene. The two mechanisms of restriction of infection differ in that the localization caused by the virus has been overcome repeatedly by mutation in Jensen's No. 14 virus whereas that caused by the *N. glutinosa* gene has never been broken down.
As measured by the ability to produce yellow spots on the leaves of Turkish tobacco, a normal and three derived strains of tobacco mosaic virus differed in mutability and all showed more mutability in the late winter and early spring.

*Riker, A. J.* *Bacteria pathogenic on plants.* (*pp. 46–56*).
The author briefly reviews some of the literature relevant to the problems of variation in bacteria. There is a considerable range of variation in the bacteria as well as of symptoms in the plants attacked. That problems in genetics are involved is suggested by the fact that in some cases, changes in virulence occur gradually, in others suddenly. The genetical as well as the physiological constitution of the host plant must also be considered when a study is made of the variation of the bacteria.

*Craigie, J. H.* *The origin of physiologic races of rust fungi through hybridization.* (*pp. 66–72*).
Most of the investigations on the origin of physiological races of rust fungi have been made on the stem rust of cereals, *Puccinia graminis* Pers. Although it is possible that hybridization may occur in any heterothallic rust that comprises physiological races, crosses have only been made between races of *P. triticina* Erikss. and *P. graminis*.
The results of the crosses between races of *P. graminis* show that races different from either parent may occur in the $F_1$. In one cross, *P. graminis tritici* 9 x *P. graminis avenae* 6, the hybrid belonged to no known variety. It is noted that uredospore colour and pathogenicity are inherited independently and that in general both are inherited according to Mendelian laws. There is also some evidence for maternal cytoplasmic inheritance. Certain abnormalities have been shown to occur as the result of continued inbreeding but these are unlikely to be found in nature.
There is, however, evidence that hybridization occurs in nature and leads to the origin of new species.

*Rodenhiser, H. A.* *The origin of physiologic races in the smut fungi by hybridization.* (*pp. 73–76*).
The results of experiments in hybridization of the smut fungi by various workers are described. It is shown that such crosses are readily made in the laboratory and that in this way entirely new races may develop differing from the parents in cultural characteristics, morphology and pathogenicity. There is also evidence for the occurrence of hybridization in the field.

*Christensen, J. J.* *The origin of parasitic races of phyto-pathogenic fungi through mutation.* (*pp. 77–82*).
Mutation is recognized as of common occurrence in both haploid and diploid lines of fungi. Though the frequency of mutants appears at first sight to be very high, if the numbers of individuals (sporidia) are considered, it is probably not greater than in the higher plants. The mutants may arise in the laboratory or on living hosts; they may occur in a wide range of characters and their stability may vary considerably. Several factors, such as the concentration and kind of nutrient used, high temperatures, X-rays and ultra-violet rays may have an effect on the induction of mutation.
The smut fungi especially offer excellent material for a study of mutation.

*Stakman, E. C.* *Summary.* (*pp. 83–90*).
In this article the author sums up the results recorded by the contributors to the symposium. He discusses the question of variation, its possible origins in both plants and animals from various angles and points out the need for further research.

416. Filinger, G. A. and
Cardwell, A. B. 632.111:578.08
**A rapid method of determining when a plant is killed by extremes of temperatures.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 85–86.
It was found that bramble canes killed by freezing or by boiling offered less resistance to an electric current than when they were alive.

417. Hirschhorn, E. and
Hirschhorn, J. 632.451.2:576.16:575.24:633.15
Formas fisiólogicas en "Ustilago zeae" de diversas localidades de la Argentina. Su clasificación geográfica. (**Physiological forms in *U. zeae* from different localities of Argentina: their geographical classification**).
Physis, B. Aires 1939 : **18** : 181–222.
Full details of the study are presented; 465 different physiological forms have been identified, many of them possessed of great mutability. They are classified into four main groups Differences in mutability have been observed between populations from different localities.

418. Kernkamp, M. F. and
Martin, W. J. 632.451.2:576.16:633.15
**The pathogenicity of paired haploid lines of *Ustilago zeae* versus the pathogenicity of numerous mixed haploids.**
Phytopathology 1941 : **31** : 1051–53.
Northwest Dent maize seedlings were inoculated with single pairs of haploid lines of *Ustilago zeae* and with bulk inoculum comprising all the haploid lines used in the single pairs. The infection rating from the composite inoculum was lower than that from several of the single pairs of haploid lines. The explanation of this result is discussed and it is pointed out that care should be taken in classifying resistant varieties on the basis of their reaction to bulk inoculum.

419. Flor, H. H. 632.452:576.16:633.52:575.1
**Pathogenicity of aeciospores obtained by selfing and crossing known physiologic races of *Melampsora lini*.**
Phytopathology 1941 : **31** : 852–54.
The reactions of differential varieties of flax to inoculation with three races of *Melampsora lini* and with $F_1$ aeciospores produced by inbreeding and crossing these three races are given in a table. Races 22 and 24 were homozygous for pathenogenicity to the eleven differential varieties and race 6 was homozygous for pathogenicity to ten varieties. Factors for avirulence are dominant to the factors for virulence.

## ECONOMIC PLANTS 633

420. Šlykov, G. N. 633:576.16
(**On the origin of our cultivated plants**).
Priroda (Nature) 1941 : No. 1 : 34–41.
Many examples are given of the gradual domestication of wild berries such as the cranberry, and various species of *Vaccinium*, *Sorbus*, *Actinidia* and *Rosa*. The same process was exercised many millennia ago with herbaceous crops, independently both in the Old and the New World. The existing data on the main centres of origin of the cultivated plants are outlined. The different methods whereby different plants have been taken into cultivation are discussed, several cases of plants that have changed their function being cited, and the frequency with which the main area of cultivation has passed to another continent —e.g. cacao, coffee, citrus— is mentioned. For woody trees the main factor for successful introduction has proved to be the correspondence between the growing period of the new area and that of the tree introduced. Great efforts are now being made to extend the range of crops cultivated in the Soviet Union.

421. Kusatz, H. 633–1.521.5(43.6)
Saatgutzüchtung und Sortenbereinigung in der Ostmark. (**Seed production by breeding and purification of varieties in Ostmark**).
Wien. landw. Ztg 1941 : **91** : 72–74.
A full account of the regulations and measures adopted by Germany in Ostmark to promote

the production of high grade seed and varieties of the different crop plants. In addition to the improvement of quality, the elimination of synonyms and inferior varieties has been an important aim in the programme for the maintenance or production of good varieties.

422. PAINTER, R. H. 633–2.7–1.521.6
**The economic value and biologic significance of insect resistance in plants.**
J. Econ. Ent. 1941 : **34** : 358–67.

In this general review the following topics are discussed: resistant varieties as a principal control method; as an adjunct to other methods; in relation to the general population level of the insect involved; in relation to insect hyper-parasitism and in relation to chemical control. The interrelations of factors affecting insect resistance in plants are considered in terms of the three characteristics preference, antibiosis (adverse effect on the biology of the insect) and tolerance. Finally the problem of permanence of resistance and the evolutionary importance of insect resistance are considered.

423. SNELLING, R. O. 633–2.7–1.521.6:575
**Resistance of plants to insect attack.**
Bot. Rev. 1941 : **7** : 543–86.

This appears to be a very comprehensive review. There are 567 references in the bibliography. The word "resistance" is used in its widest sense and includes those characteristics which enable a plant to avoid, tolerate or recover from the attacks of insects under conditions that would cause greater injury to other plants of the same species. The review is divided into four parts—introduction, records and importance of host resistance, plant characteristics suggested as having an influence in resisting insect attack, and breeding plants to reduce insect damage. There are three tables—records of insect resistance, plant characteristics suggested as having an influence in resisting insect attack, and records of accomplishments in breeding plants for insect resistance.

424. SNELLING, R. O. 633–2.7–1.521.6:575
**The place and methods of breeding for insect resistance in cultivated plants.**
J. Econ. Ent. 1941 : **34** : 335–40.

After some general remarks on the type of organization and worker needed for research on varietal resistance to insect pests, the advances made so far are reviewed under the headings introduction, selection, hybridization and grafting.

## CEREALS 633.1

425. PLOTNIKOV, I. G. 633.1:575.257
**(Vegetative hybridization of cereals and its importance in breeding work).**
Socialistic Grain Farming, Saratov 1940 : No. 6 : 69–88.

Various methods applied with success for grafting cereals are described; some involve the vegetative organs, some the embryo. Over 1,000 grafts were made in 1939. Grafts of the wheat Lutescens 062 on *T. durum* gradually showed more resemblances to *T. durum* after ear emergence; the grains formed by the scion were intermediate in character and were more vitreous and deeper red in colour than the ungrafted 062. The graft of Candicans 75/09 on 434/154 (wheat-rye hybrid) had much larger ears and gave a much higher yield (25 spikelets with 68 grains weighing 2·59 grm. as compared with 19 spikelets with 38 grains weighing 1·52 grm. in the control); the ears also matured earlier. A winter form grafted on to a spring form gave ears in the first year.
The first generation plants obtained by sowing the seeds proved intermediate in such respects as leaf pubescence, grain colour and vitreousness and higher than either parent in protein content.

## WHEAT 633.11*

426. 633.11:575
**A new winter hardy wheat.**
J. Dep. Agric. Eire 1941 : **38** : 175–76.

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* See also Absts 378 and 387.

It is stated that the Dutch plant breeder, Dr Mansholt, has produced a new white-seeded winter wheat from the cross Carsten V x Juliana. The new variety (not yet named) is a heavy yielder.

427. Builin, D. P. 633.11:575(47)
**(New varieties of winter wheat).**
Socialistic Grain Farming, Saratov 1941 : No. 3 : 57–59.

The pedigrees of 3 new hybrid varieties from the Bezenčuk station are given. Milturum B-G 84 is a complex hybrid in which *T. durum* features, is extremely winter-hardy, though 1–2 days later than the standard, Lutescens 1060/10, which it has outyielded by 9% in the 4 years period 1937–40. Under irrigation its superiority in yield was still greater and it proved better also in standing capacity.
The other 2 hybrids, both from a cross between 2 varieties of Erythrospermum, are less winter-hardy than Lutescens 1060/10 but much better in yield; 1 of the varieties, Erythrospermum B-G 89, is 2–3 days and the other, B-G 87, is 5 days earlier than 1060/10 in earing; both have larger vitreous grain and are more resistant to lodging. B-G 89 yields well both with and without irrigation.

428. Žogolev, A. M. 633.11:575(47)
**(A new variety of winter wheat in the fields of the collective and state farms).**
Socialistic Grain Farming, Saratov 1941 : No. 2 : p. 100.

The variety Velutinum 081, named Ul'janovka, is once more described (cf. "Plant Breeding Abstracts", Vol. X, Abst. 739).

429. Kihara, H. and
Matsumura, S. 633.11:575.127.5:633.11 *Aegilops*:576.356
Genomanalyse bei *Triticum* und *Aegilops*. VIII. Rückkreuzung des Bastards *Ae. caudata* x *Ae. cylindrica* zu den Eltern und seine Nachkommen. **(Genom analysis in *Triticum* and *Aegilops*. VIII. Back-crossing of the hybrid *Ae. caudata* x *Ae. cylindrica* to the parents and its progeny).**
Cytologia, Tokyo 1941 : **11** : 493–506.

In the first maturation division of the $F_1$ hybrid of the cross *Ae. caudata* L. ($n = 7$) x *Ae. cylindrica* Host. ($n = 14$), 7 bivalents and 7 univalents were observed. The bivalents were very closely associated and 1 2 trivalents were frequently seen. No restitution nuclei or unreduced gametes were noted. The hybrid has 0·5% good pollen grains and shows only 0·07% of fertility with open-pollination. Back-crossing to either parent gives a fairly good set.
Details are given of the back-cross of the $F_1$ with *Ae. caudata* and with *Ae. cylindrica*. Of the two plants from the first mentioned back-cross, one plant, No. 231, had a high fertility (44·3%) with open-pollination while the other, No. 230, showed only 4·5%. Under conditions of isolation the fertility was 15·9% and 6·3% respectively. The percentage of good pollen was 98% and 80%. All the progeny had 7 bivalents. Fertility varied greatly with most of the plants in the intermediate class as in *Ae. caudata*. It is suggested that the plant with low fertility represents a variant limited by external conditions.
In the progeny of No. 230 there was a segregation of the seedlings into 3 normal to 1 *xantha* and among the progeny of No. 231 the segregation of 3 normal to 1 albino was observed.
The awning of the lateral spikelets and the time of maturity were inherited monofactorially.
Homology is shown to exist between the genom of *caudata* and one of the two genoms of *cylindrica*, which must be the C genom, assuming the formula of *cylindrica* to be CCDD.
In the back-cross of the $F_1$ with *Ae. cylindrica* one plant (No. 235) was obtained with 27 somatic chromosomes. This was back-crossed with *Ae. cylindrica* and 8 individuals with 27, 2 with 28 and 1 with 29 chromosomes were found.
The fertility of No. 235 was 10·3%. All the progeny were fertile and all had at least the two complete genoms of *Ae. cylindrica*.
Details are given of the variation in chromosome number among the progeny with chromosome numbers varying from 27–30. The explanation suggested is a translocation between two chromosomes of the $F_1$ hybrid. R. M. I.

430. HOROVITZ, S. 633.11:575.127.5:633.14
Nuevo tipo de híbrido constante de trigo x centeno ("Triticum vulgare" x "Secale cereale"). [**New type of constant wheat x rye hybrid. (*T. vulgare* x *S. cereale*)**].
Physis, B. Aires 1939 : **18** : 285–90.

A cross between a Chinese form of *T. vulgare* and common rye was made in 1924 and the results are here described. Certain plants of fairly high fertility were obtained in $F_3$ and $F_4$ and a good plant of wheat type, No. 17, was selected in $F_5$. The progeny of this plant was included in the wheat variety trials, and subjected to further selection. The hybrids are pubescent at the base of the rachis as in rye but in other morphological characters and in chromosome number and behaviour they resemble wheat.
The wheat variety 38 M.A., which had the same Chinese wheat as one of its parents, has inherited its facility for crossing with rye and is thought to be of possible value as a bridging form in making wheat-rye crosses.

431. CAMARA, A. DE SOUSA DA 633.11:575.243
Acção do calor sobre os fenotipos do *"Triticum monococcum,"* L. (**Action of heat on the phenotypes of *T. monococcum*, L.**).
Rev. Agron. Lisboa 1940 : **28** : 229–41.

Seeds of *T. monococcum* were kept for 30 days at 60° C., followed by 8 days at laboratory temperature, after which they were germinated. The grain from the resulting plants gave rise to progenies containing a number of aberrant plants. Chlorophyll deficiencies, compactoids, glume anomalies and varying forms of sterility were among the alterations observed. All were recessive and devoid of any practical value.
A number of non-inherited modifications were observed also in the plants arising from the treated seeds and to a lesser extent in their progeny. These consisted of new characters such as torsion, branching of the ear and various anomalies of the ear and leaf closely resembling hereditary mutations previously observed. All were however normally fertile.
An attempt was made to obtain the forms with branched ears also in the form of mutations, for which purpose seeds were treated with X-rays. No branched form however occurred in a large number of mutants examined. In *T. turgidum* var. *pseudo-mirabile* on the other hand treatment with both heat and X-rays greatly increased the number of branched ears in the progeny.

432. SCHIEMANN, E. 633.11:576.16:576.356.5
Weizenstammbäume. (**Genealogical trees of wheat**).
Bot. Jb. 1940 : **71** : No. 1 : 1–31.

In a paper published in 1939, Bertsch (Mannus **31** : 171–224) derives the hexaploid wheats from a cross between *T. monococcum* and *T. dicoccum* with subsequent doubling of the chromosomes. In the present paper, the author, according to whose own work the hexaploid wheats originate in the cross *Aegilops cylindrica* x *T. dicoccum* accompanied by a doubling of the chromosomes, makes a critical examination of the theory and shows first that cytological evidence is against Bertsch's theory.
The fact that *compactum* is the only hexaploid wheat so far known to have existed in prehistoric times, does not exclude the possibility of the existence at the same time of a lax-eared *vulgare* wheat.
From a systematic point of view also, it is suggested that *vulgare* and *compactum* are much more closely related than is often allowed. Bertsch's conclusion that *vulgare* originated later than *T. Spelta* is also criticized.
The historical evidence for the origin of emmer, einkorn, *vulgare* wheat and *T. polonicum* as well as for rye and barley are also briefly discussed from the point of view of Bertsch's conclusions. R. M. I.

433. KIHARA, H. and
MATSUMURA, S. 633.11:576.356.5:575.127.2
Weitere Untersuchungen über die pentaploiden *Triticum*-Bastarde XII. Schlussmitteilung. (**Further investigations on pentaploid *Triticum* hybrids XII. Final communication**).
Jap. J. Bot. 1940 : **11** : 27–39.

The first contribution to this series, by H. Kihara, appeared in the Japanese Journal of Botany 1925, Volume II, pages 299–304. Subsequent contributions have been reviewed in "Plant Breeding Abstracts", as follows: II, Vol. II, Abst. 592; III, Vol. IV, Abst. 125; IV, Vol. VI, Abst. 503; V, Vol. VII, Abst. 604; VI, Vol. VIII, Abst. 105; VII, Vol. VIII, Abst. 104; VIII, Vol. IX, Abst. 682; IX, Vol. X, Abst. 104; X, Vol. XI, Abst. 350 and XI, Abst. 434 below. In this, the final contribution, the results of the studies are reviewed.

434. MATSUMURA, S. 633.11:576.356.5:575.127.2
Weitere Untersuchungen über die pentaploiden *Triticum*-Bastarde XI. **(Further investigations on pentaploid *Triticum* hybrids XI).**
Jap. J. Bot. 1940 : **11** : 17–25.

The first part of this paper deals with the relation between the chromosome number and the form and germination of the $F_2$ grains of the hybrid *T. persicum* Vav. var. *stramineum* Zhuk. ($2n = 28$) x *T. compactum* Host. var. *creticum* Mazz. ($2n = 42$). No close relationship between chromosome number and form (development of endosperm) such as was found in the back crosses (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 682, and Vol. X, Abst. 104) could be demonstrated. The many wrinkled grains are attributed to the fertilization of embryosacs with lower chromosome numbers by male cells with higher. Of 181 grains planted, 128 germinated; 15 died during the winter and the chromosome numbers of 107 of the remainder were determined. The grains which failed to germinate and those which gave inviable seedlings were wrinkled or shrivelled. In the group with 36–41 chromosomes there was a negative correlation between chromosome number and days to germination, while in the 29–34 chromosome group there was no correlation.

The second part deals with a repetition of the different back-crosses of the hybrid *T. polonicum* x *T. Spelta* (cf. "Plant Breeding Abstracts", Vol. VI, Abst. 503, and Vol. VIII, Abst. 105). The previous results were confirmed as regards the frequency distributions of chromosome numbers in the functioning female and male gametes of the $F_1$ as shown by the chromosome numbers of the progeny from equation ($F_1$ x parent) and certation (parent x $F_1$) crosses. In the cross $F_1$ x *T. Spelta* the grains with higher chromosome numbers had better developed endosperm and quicker germination. In the cross *T. polonicum* x $F_1$ the same was true of grains with lower chromosome numbers. In the crosses *T. Spelta* x $F_1$ and $F_1$ x *T. polonicum*, there was no relation between chromosome number and time to germination and almost all grains were well-developed.

435. NIKOLAENKO, E. I. 633.11:581.143.26.035.1
**A short-day wheat from China.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 353–55.

The variety *lutinflatum* Flaksb. which comes from the mountainous part of Western China, was found to be a short-day plant. It is also suggested that short-day forms segregate out from crosses between *Triticum sphaerococcum* Perc. and spring wheats.

436. GREKOV, P. I. 633.11:581.143.4:581.483
Verstärkte (verdoppelte) Ernährung des Embryo der Sommerweizen mit Endosperm und ihr Einfluss auf die erste Generation. [**Intensified (doubled) nutrition of the embryo of spring wheat with endosperm and its influence on the first generation**].
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 834–37.

To increase the nutrition of the embryo the endosperm of another grain of the same variety is stuck to the cut surface of the grain with flour paste. Plants raised from grains treated in this way develop more quickly and ripen earlier than controls. Their yield of grain and total yield are higher than controls. The first generation of such plants exceed both controls and plants raised from "doubled" seed in grain yield and total yield.

When the supplementary nutrition of the embryo is derived from the endosperm of a different variety the influence on rapidity of development is not seen until the beginning of ear formation and flowering. Maturity is hastened or retarded according to whether the extra endosperm comes from an earlier or later variety, but is in neither case as early as when the extra endosperm is of the same variety. Increased yields were also obtained in these experiments.

437. KNIAGINICHEV, M. I., MUTUL, I. F. and PALILOVA, J. K. 633.11:581.192
**Wheat species characterized according to activity and quality of amylase in their grain.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 1020–23.

The amylolytic activity and composition of sugars in the autolysate after hydrolysis for one hour at 30° C. were determined for the grain of a number of wheat species. The cultivated species of hard 28-chromosome wheats (*Triticum durum* and *polonicum*) form much more maltose in their grains than the other 28-chromosome wheats such as *T. persicum* and *T. dicoccum* and the 14- and 42-chromosome species. The amylolytic activity was found to be very low in *T. monococcum*. The temperature coefficient and the activation energy of the saccharizing amylase are much higher in soft wheats than in *T. durum*, *T. monococcum* and *Aegilops*.

438. 633.11:581.9(4)
*LOMEYKO, S. 633.11:576.16(49.7)
**[The routes by which wheat (*T. vulgare* Vill.) has penetrated into Europe from its centre of origin—a contribution to the study of the origin of domestic wheats).**
Arhiv Minist. Poljopr. 1939 : **6** : No. **14** : 97–126.

Assuming that the direction in which the loss of characters and genes occurs most gradually indicates the route by which a species has migrated from its centre of origin, the author shows that *Triticum vulgare* has penetrated into Europe from Afghanistan by the route Persia—Asia Minor—Balkan Peninsula and not by either of the two routes, Turkistan—north of the Caspian Sea and southern Russian steppes—Caucasus. Thus in Afghanistan there are 76 botanical varieties, in Persia 53, in Asia Minor 50, and in the southern portion of the Balkan Peninsula 33. Special consideration is given to the black varieties—there are 14 or 15 of these in Afghanistan and Persia, 20 in Asia Minor, 6 in the Balkan Peninsula and 5 in the Danube region. The presence of 20 black varieties in Asia Minor indicates the presence in Asia Minor of a secondary centre of morphogenesis. The Banat and ancient Crimean wheats are also considered—it is suggested that these wheats are of Asia Minor origin and were introduced by the Turks relatively recently. The history of the introduction of wheat into Europe is discussed—it is suggested that the old dense eared types were replaced by the modern lax eared varieties in 2,000–1,500 B.C. and that this was due to the peoples of the bronze age. The introduction of the lax ear type coincides with the extensive Aryan migrations which probably drove a part of the Asia Minor indigenous population into the Balkan Peninsula.

439. HOROVITZ, N. 633.11:582(82)
Descripción de variedades agrícolas de trigo por sus caracteres morfológicos.
**(Description of agricultural varieties of wheat by their morphological characters).**
"Granos" Semilla Selecta, B. Aires 1939 : **3** : 5–130.

Descriptions are given of 92 varieties of *Triticum vulgare*. The characters on which the descriptions are based are growth habit, pubescence of leaf sheath, auricles and nodes, colour of auricles and leaf blade, certain other leaf blade characters, tillering, date of ear emergence, glaucousness, resistance to rust species, pigmentation of coleoptile and anthers, position of mature ears, height of mature plant, and the characters of the mature stem, of the ear and of the grain. A diagnostic key is given for the determination of the varieties, each of which is then described separately, with illustrations and indications of the parentage.

440. SAPRYGUINA, E. 633.11–2.111–1.521.6:581.143.26.03
**Cold-resistance of wheat $F_2$ hybrids with reference to phasic characteristics of their parents.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 840–43.

The cold resistance of $F_2$ progenies from crosses between spring wheats and winter wheats were determined under both field and laboratory conditions. The parent varieties differed in their

* An extended summary of this paper is on file at the Bureau.

lengths of vernalization phase, lengths of light phase and cold resistances. The first groups of crosses showed that the cold resistance of the hybrids increased with the length of the light phase of their spring parents; the second group of crosses showed the cold resistance of the hybrids increased with the increasingly long developmental phases of their winter parents; and the third group of crosses in which one of the parents had one of the phases (either the vernalization or the light phase) long and the other phase short and in which the other parent had both its phases long, showed very little variation as regards frost-resistance. It is suggested that segregation in hybrid progenies with respect to cold resistance can be foretold from the phasic characteristics of the parents.

441. Rodenhiser, H. A. and
Clark, J. A. 633.11–2.451.3–1.521.6
**Summary of uniform spring wheat bunt nursery, 1940.**
U.S. Dep. Agric., Bur. Pl. Ind., Div. Cereal Crops and Dis., Washington, D.C. **1941 : 44–45.** (Mimeographed).

A large number of varieties and selections showed a high degree of resistance to bunt, averaging less than 1% infection as compared with 35·2% infection in Ceres and 64·5% in Ulha. Hope and H–44 when crossed with Thatcher and Ceres imparted as much resistance to these crosses as did Hussar to other crosses. The resistance of Hope and H–44 to bunt is obtained from their Emmer parent and this resistance behaves as a recessive while the resistance or near-immunity of Hussar is dominant. In some crosses the recessive Emmer resistance was stronger than the dominant resistance of other crosses which originally came from Hussar.

442. Humphrey, H. B. and
Clark, J. A. 633.11–2.452–1.521.6
**Summary of uniform spring wheat rust nursery for 1940.**
U.S. Dep. Agric., Bur. Pl. Ind., Div. Cereal Crops and Dis., Washington, D.C. **1941 : 42–43.** (Mimeographed).

The severities of infection of a number of wheat varieties by both stem and leaf rusts are recorded in two tables. The average infection for 24 stations with stem rust were—1·1% for Pentad and 13·4% for Mindum in the *durum* group, 0·6% for Merit, 7·6% for Thatcher, 37·1% for Ceres and 54·6% for Marquis in the hard red spring group and 0·0% for *T. Timopheevi* and 3·9% for Khapli Emmer. The corresponding leaf rust data include 4·8% for Kubanka–75, 5·3% for Mercury, 7·9% for Hope and 66·9% for Thatcher and in the Emmer group 0·1% for *T. Timopheevi*. The new varieties Pilot, Rival, Renown, Merit and Premier all had low average infections of between 10 and 18% leaf rust.

443. 633.11–2.7–1.521.6:575
Packard, C. M. 633.31–2.7–1.521.6:575
**Breeding wheat and alfalfa for resistance to insect attack.**
J. Econ. Ent. **1941 : 34 : 347–52.**

Resistance to the Hessian fly (*Phytophaga destructor*) has been found in the wheat varieties Dawson, Kawvale, Marquillo, F.P.I.94587 and Illinois No. 1. The durum wheat 94587 is the only one which has shown almost complete immunity under all conditions. Marquillo and Illinois No. 1 are, like F.P.I.94587, spring wheats, while the winter wheat Dawson shows little resistance to Hessian fly in the soft winter wheat region. The breeding problem in that region was therefore to incorporate the fly resistance of the spring varieties in otherwise satisfactory winter wheats. On the other hand, when the breeding of resistant spring wheats for central California was started, Dawson was the most promising source of fly resistance and the problem there was the opposite of that encountered in the Middle West.

The breeding work on this problem in the past decade has shown that resistance can be combined with spring or winter habit, with other desirable characters and in particular with resistance to fungous diseases. The partially resistant variety Kawvale, released in 1931, is now the leading variety in Eastern Kansas.

The factors conferring resistance are not known. It is now generally believed that distinct biological races of Hessian fly exist. Resistance varies widely with environmental conditions.

Resistance to pea aphid (*Macrosiphum pisi*) has been found in individual plants of lucerne and in the variety Ladak. Breeding studies have shown that resistance can be handled according to well established principles of genetics and breeding.

444. FIFIELD, C. C. et al 633.11:664.641.016
**Chemical, milling and baking experiments with hard red spring wheats, 1940 crop.**
U.S. Dep. Agric., Bur. Pl. Ind., Washington D.C. 1941 : Pp. 28. (Mimeographed).

The yields, test weights, crude protein contents, flour yields, ash content of flour, water absorption of flour, loaf volumes by four methods, crumb colour and grain texture are given for eight standard varieties and for several new strains of wheat. The new strains include Pilot 13, Regent, Vesta, Ceres-Double Cross x Ceres-Hope-Florence (No. 2829) and H-44 x Thatcher (II-29-52).

445. BAYLES, B. B. and 633.11.00.14(73)
TAYLOR, J. W. 633.11–2.45–1.521.6
**Report of the Uniform Soft Winter Wheat Nurseries 1938–39.**
U.S. Dep. Agric., Bur. Pl. Ind., Div. Cereal Crops and Dis., Washington, D.C. 1940 : Pp. 11. (Mimeographed).

BAYLES, B. B. and
TAYLOR, J. W.
**Report of the Uniform Eastern Soft Winter Wheat Nurseries 1939–40.**
Ibid. 1941 : Pp. 11. (Mimeographed).

Thirty varieties of wheat are grown each year at about 22 locations in the eastern states of the U.S.A. In 1939 the following seven new varieties were included for the first time—Purdue No. 4, Early Premium, Canawa, Yorkwin, Clarkan, Thorne and Brill. In 1940 three new varieties were included for the first time—Purdue No. 6, Purdue No. 7 and Wabash. The yields, winter survival, dates of ripening, plant height and lodging, test weight and reactions to leaf rust, stem rust, loose smut and bunt are given in a series of tables. Kawvale has shown consistently low infection with loose smut in all tests. Minturki was the only variety to show enough resistance to bunt to be of any value in a breeding programme. Wabash showed a high degree of resistance to leaf rust and Kawvale a moderate resistance. Hope-Cheyenne (C.I. 11969), Hope-Kawvale (C.I. 11959), Hope-Turkey (C.I. 11964), Hope-Mediterranean (C.I. 11763) and Hope-Hussar (C.I. 11682) averaged less than 10% infection by stem rust in the Uniform Rust Nurseries at 16 stations where good infection occurred in 1940.

446. CLARK, J. A. 633.11.00.14(73)
**Results of spring wheat varieties grown in cooperative plot and nursery experiments in the spring wheat region in 1940 with averages for 1929 to 1940.**
U.S. Dep. Agric., Bur. Pl. Ind., Div. Cereal Crops and Dis., Washington, D.C. 1941 : 1–41. (Mimeographed).

Yields, test weights, dates of heading and ripening, height and leaf and stem rust infection data are given for a number of varieties of hard red spring and durum wheats and for new strains of wheat obtained both by hybridization and selection. The results of milling and baking experiments are also given.

## OATS 633.13*

447. 633.13:575.127.2:576.356.5
FETISSOV, A. I. 633.1:576.356.5:581.04
**Chromosome doubling by colchicine and crossability of tetraploids in *Avena brevis* (Roth).**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 705–09.

Dry seeds, embryos and germinated seeds of wheat, oats and barley were treated with colchicine solutions. A large number of plants were obtained only by the treatment of dry seeds as the other two treatments killed the embryos. Root tips were examined cytologically

* See also Abst. 378.

—46·3% of the seedlings of oats, 9·1% of the barley seedlings and 5% of the wheat seedlings had tetraploid cells in their root tips. An examination of the progenies in the next year showed that ten diploid-tetraploid chimaeras and one wholly tetraploid seedling had been produced from 141 plants obtained from colchicine-treated seeds.

Tetraploid *Avena brevis* ($2n = 28$) female was found to cross easily with *A. sativa* ($2n = 42$) and *A. barbata* ($2n = 28$). Diploid *A. brevis* ($2n = 14$) will not cross with these two species. No seeds were obtained from the cross tetraploid female x diploid male *A. brevis*.

448. Kugler, W. F. and Foucault, S. 633.13:582(82)

Descripción de variedades agrícolas de avena por sus caracteres morfológicos. (**Description of agricultural varieties of oats by their morphological characters**).

"Granos" Semilla Selecta, B. Aires 1939 : **3** : 169–82.

Descriptions are given of three varieties of *Avena sativa* L. and one of *A. byzantina* Koch. The characters used are pigmentation of leaf, habit of growth, pubescence of the leaf margin and of the leaf sheath, characters of the stem, leaf, panicle and grain and dormancy period.

449. Chesnokov, P. G. 633.13–2.7–1.521.6:581.9

**World's assortment of oat varieties in relation to the Swedish fly.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 718–21.

The resistance to the frit fly (*Oscinella frit*)—expressed as per cent of plants infected and per cent of plants which gave no yield—was investigated for a number of forms of *Avena abyssinica, brevis, strigosa, byzantina, sativa* and *fatua*. The most resistant types were found in *Avena sativa*, particularly in local varieties from S. Sweden. The geographical distribution of resistance and its relation to various characters of the oat plant are discussed.

## RYE 633.14

450. Krasnjuk, A. A. 633.14:575.14

(**Twelve years inbreeding rye**).

Socialistic Grain Farming, Saratov 1941 : No. 2 : 26–46.

Inbreeding work with rye was started at Saratov in 1926 but has led the author finally to the conclusion that the method is of no practical value. Tabular data are presented to show that even the best inbred selections were unable to compete with out-pollinated material. Even after the inbreeding was discontinued the yield of the experimental material remained lower than that of the controls.

Other adverse effects of inbreeding were seen in plant height, which continues to fall off even in advanced generations of inbreeding, e.g. 35th and later. Other qualities affected were the productive tillering capacity, grain size and quality, germination of grain, and winter-hardiness. Diallel crosses were made between a large number of inbred lines but no favourable combination was discovered.

Observations showed that rye pollen is carried by the wind for distances of 1,500 m. and more, in view of which the spatial isolation of 1 km. prescribed by the seed production regulations is inadequate to prevent cross-pollination, since pollen kept under natural conditions, exposed to sun and wind, did not lose its capacity for effecting fertilization for 180–240 minutes or even longer, and would certainly not lose its viability in transference over the distance of 1 km.

Figures are given showing that seed obtained from free crossing between a number of varieties gives higher yields than "original" seed; the grain weight and the proportion of green to yellow seeds was also greater. The new variety so obtained is being extensively sown in practice.

451. 633.14:576.356.5:581.04

Sengbusch, R. v. 575.255

Polyploider Roggen. (**Polyploid rye**).

Züchter 1940 : **12** : 185–89.

In 1937 the author selected twin plants of rye in the hope of finding polyploids among them but out of 654 twins, 4 triplets and 1 quadruplet found among 2 million germinating seeds, only one haploid and no polyploids were found.

In 1938 colchicine was used with success. Both polyploids and chimaeras were found among plants from seeds germinated in colchicine solution.

The seed setting of the polyploids was very low. R. M. I.

452. JENKINS, M. T. 633.15:575(73)
**Report of the Second Southern Corn Improvement Conference held at Knoxville, Tennessee August 26 and 27, 1940.**
Washington, D.C. 1940 : Pp. 49. (Mimeographed).
Reports of the maize improvement investigations in the following states are given—Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee and Texas. There is also a report from the U.S. Department of Agriculture. The reports include details of the yields of hybrids and varieties and of the inbred lines developed at the various stations.

453. 633.15:575.12(73)
**Nation-wide survey shows third of U.S. corn acreage is hybrid.**
Seed World 1941 : **50** : No. 7 : 24–26.
In 1941, 33,000,000 (37%) of the 87,000,000 acres of maize grown in the U.S.A. were sown with hybrid seed. In the Corn Belt 31,000,000 out of 50,000,000 acres were sown with hybrid seed. In Iowa and in parts of the adjoining states 95% of the maize acreage was devoted to hybrid maize and in some counties virtually 100%. The resulting increase in yield has been accompanied by a decline of the maize acreage in the Corn Belt from 62,000,000 acres in 1936. Outside the Corn Belt there have been substantial increases in the proportion of the maize acreage planted with hybrids in the East and North East and in the Pacific North West.

454. RANDOLPH, L. F. 633.15:576.312.35:576.312.341
**Genetic characteristics of the B chromosomes in maize.**
Genetics 1941 : **26** : 608–31.
This paper gives a comprehensive account of the B chromosomes in maize, of their possible origin and of their behaviour. The B chromosomes have a very distinctive pachytene structure which is unlike that of any region of equal length in the A chromosomes. The B chromosomes are transmitted freely by both male and female gametes. The number of B chromosomes was determined in 1049 plants from selfed progenies of plants having from one to twenty B chromosomes, in 909 plants from direct and reciprocal crosses of plants having no B chromosomes with plants possessing from one to twenty-five B chromosomes and in 788 plants from sib crosses of plants with different numbers of B's. The highest number of B chromosomes found in any plant in addition to the normal twenty A chromosomes was 34. Many plants were obtained with from 20 to 30 B's, as well as with lower numbers, but there were very few with more than 30 B's. The behaviour of the B chromosomes in microsporogenesis and in the microspore division was studied. The B chromosomes are not essential to the normal growth and reproduction of the plant and there is not any conclusive evidence to show that they have any beneficial effects. Plants with a large number of B chromosomes show a reduction in fertility and vigour, have pollen of increased size and produce defective and germless seeds with scarred endosperms. In tests to determine the genic constitution of the B chromosomes, the presence of B's in the segregating progenies caused no significant disturbances of the expected ratios in crosses involving 46 linked genes and 7 unlinked genes. C, D, E and F chromosomes are produced by breakage of B chromosomes. These chromosomes are perpetuated from generation to generation like the B chromosomes. Observations on plants with large numbers of D chromosomes suggest that the various genetic effects of large numbers of B's may be due to genes located in the euchromatic rather than in the heterochromatic region of the B chromosome.

455. MCCLINTOCK, B. 633.15:576.356.2:575.242
**The association of mutants with homozygous deficiencies in *Zea mays*.**
Genetics 1941 : **26** : 542–71.
The aberrant mitotic behaviour of ring-shaped chromosomes in maize (see "Plant Breeding Abstracts", Vol. VIII, Abst. 1536) was used to produce plants which had sectors homozygous for minute deficiencies. Two cases of deficient rod chromosomes with compensating ring chromosomes were studied—both involve chromosome 5. The rod chromosome, Df-1, is deficient for the four chromomeres adjacent to the centromere and the Df-2 chromosome is

* See also Abst. 378.

deficient for the same four chromomeres plus the next five chromomeres. The two compensating ring chromosomes, R-1 and R-2, possess these same four and nine chromomeres respectively. Thus when a sector of a plant of constitution Df-1 Df-1 R-1 R-1 loses both its ring chromosomes, this sector will be homozygously deficient for four chromomeres. The following mutant characters were found to be associated with deficiencies in the four chromomeres next to the centromere—brown cell walls, pink, blotch and blotch-dries. These simple mutants may have a normal growth rate. Of the compound mutants from this region, brown-pink, brown-pink-dries and brown-blotch-dries may have normal growth rates but the following have considerably reduced growth rates; brown-pink-dries-poor growth, light green-poor growth and brown-light green-poor growth. The mutant characters associated with chromomeres 5 to 9 are pale green, striate and white. The ring chromosomes can also become altered in size by a process involving somatic crossing-over—thus the R-2 ring may be reduced to six chromomeres. The mutant characters associated with these changes and their transmission through the embryo-sacs and pollen were studied. The compound mutants (see above) were shown to consist of two or more simple mutants. All the results suggest that the mutant characters observed are due to small homozygous deficiencies and that such homozygous deficiencies are not cell lethal. One of the characters, brown cell walls, is strictly comparable with the known mutant *bm* (*bm* has also been previously located within the limits of region 1 to 4 of a normal chromosome 5).

456. Bryan, A. A. and
Sass, J. E. 633.15:581.45:575.11
**Heritable characters in maize 51—"knotted leaf".**
J. Hered. 1941 : **32** : 343–46.

Knotted leaves are controlled by a dominant gene *Kn* which lies in the first linkage group between $f_1$ and $bm_2$, 31·6 units from $f_1$ and 23·5 from $bm_2$. The "knots" are mainly wrinkles and folds into which the leaf is thrown by anticlinal proliferation of the inner cells of the mesophyll occurring at an early stage. The degree of expression is affected by modifying factors.

457. Marino, A. E. 633.15:581.48:575.11.061.6
Herencia del color de aleurona en el maiz "piamontés". (**Inheritance of aleurone colour in the maize "Piamontés"**).
Physis, B. Aires 1939 : **18** : 47–67.

Various plants derived from selfing the coloured variety Piamontés Colorado Klein were crossed with a number of testers for aleurone colour. Plants of various constitutions were revealed, leading to the conclusion that the original plant was *Aa C¹c Rr Prpr*. This accounts for the constant production of colourless grains by the variety in question.

458. Ullstrup, A. J. 633.15–2.484–1.521.6:575.11
**Inheritance of susceptibility to infection by *Helminthosporium maydis* race 1 in maize.**
J. Agric. Res. 1941 : **63** : 331–34.

The only maize stock so far known to be attacked by race 1 of *H. maydis* is the inbred line *Pr*. In crosses with other lines the susceptibility of *Pr* behaves as a simple recessive, the gene concerned being designated *hm*.

459. Bigger, J. H. 633.15–2.7–1.521.6:575
**Breeding corn for resistance to insect attack.**
J. Econ. Ent. 1941 : **34** : 341–47.

In this factual review of American work on resistance to insect pests in maize, the author shows how greatly this line of work has increased in scope, organization and importance.

460. Bigger, J. H.
Snelling, R. O. and
Blanchard, R. A. 633.15–2.7–1.521.6:575
**Resistance of corn strains to the southern corn rootworm, *Diabrotica duodecimpunctata* F.**
J. Econ. Ent. 1941 : **34** : 605–13.

The resistance of maize strains (inbred lines and single crosses) to attack by the larvae of the

southern corn rootworm was measured by the resistance of the strains to lodging when grown in soils known to be infested with the insects. The insect larvae cause lodging by pruning and tunnelling of the roots. The inbred lines differed widely in their resistance, Indiana 38–11 being outstanding in its resistance. This line also transmits high resistance to its single crosses. Some inbred lines suffered markedly less leaf injury from the feeding activity of the adult insects than other lines.

461. Patch, L. H.
Still, G. W.,
App, B. A., and
Crooks, C. A. 633.15–2.7–1.521.6:575.12
**Comparative injury by the European corn borer to open-pollinated and hybrid field corn.**
J. Agric. Res. 1941 : **63** : 355–68.

The performances of open-pollinated varieties and hybrids were studied under different levels of infestation by *Pyrausta nubilalis* and subjected to an elaborate statistical analysis. One of the conclusions reached is that the hybrids were more tolerant of infestation.

## BARLEY 633.16*

462. Krajevoj, S. J. 633.16:575.255
**Chimeras in barley.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 448–50.

A chimerical barley plant, ten stems of which bore spikes of the *nutans* type and one stem a spike of the *compactum* type, was observed in a heterozygous $F_3$ family from the cross *Hordeum sativum* var. *nutans* x *H. sativum* var. *compactum*. The *nutans* type was dominant in the $F_1$ and in the $F_2$ there occurred Mendelian segregation. Chimaeras which had variegated leaves on one side of their stems and normal leaves on the other have also been observed in barley hybrids. Mention is made of the chimaeras found in wheat crosses by Åkerman (1920).

463. Karpechenko, G. D. 633.16:576.356.5:581.04
**Tetraploid six-rowed barleys obtained by colchicine treatment.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 47–50.

Two tetraploid six-rowed barley plants were obtained in the 171 plants that succeeded in completing their entire cycle of development from 280 germinated seeds which were treated with a 0·063% aqueous solution of colchicine for 45–48 hours. The progeny of these two tetraploids are described and compared with the corresponding diploids. The tetraploid DS 657/1 has a seed fertility of 0·56 as compared with 0·95 for the diploid and the tetraploid Chervonetz a seed fertility of 0·31 as compared with 0·94 for the diploid.

464. Tokhtuev, A. V. 633.16:581.143.26.03:575.11"793"
**Inheritance of the length of growing period in barley.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 147–50.

The following varieties of barley were subjected to phasic analysis:—I. 13132 *pallidum* (German), D.C. 657/1 *pallidum* (Norwegian), D.C. 1617 *coeleste* (Chinese), D.C. 1629 *Dundar beyi* (Japanese), Kruglik 021 *pallidum* (North Caucasian), D.C. 1341/6 *deficiens* (Abyssinian), D.C. 865/3 *erectum* (from Leningrad province) and D.C. 1568 *nutans* (Arabian). The German variety I. 13132 *pallidum* is the only winter barley and has a long thermo-phase (vernalization phase); D.C. 1629 *Dundar beyi* is a late variety with a medium thermo-phase and all the others have short thermo-phase. The light phase is shortest in the Chinese, Arabian and Abyssinian varieties, slightly longer in the German winter variety, of medium length in D.C. 1629 *Dundar beyi* and Kruglik 021 *pallidum* and rather long in D.C. 865/3 *erectum*.
Cyclic crosses were made with these varieties and of the 7 winter-spring crosses, 6 gave $F_1$s with dominance of spring habit and segregation in $F_2$ into winter and spring types with several times more spring than winter forms. In certain crosses the $F_1$ was earlier than either parent, a striking case being the cross D.C. 865/3 x I. 13132, in which the $F_1$ was 6 days earlier than the spring parent, which has a short thermo-phase and a long light stage. This confirms Lysenko's statement that short phases are dominant in $F_1$ which in this case has the short thermo-stage of D.C. 865/3 and the short light stage of I. 13132.

* See also Abst. 378.

The cross between I. 13132 and Kruglik 021 gave the exceptional result of a winter type $F_1$ and sharp segregation in $F_2$ into 3 winter: 1 spring type. The segregation in $F_2$ was unaffected by widely different conditions of ripening of the $F_2$ seed. Kruglik 021 gave winter types in $F_2$ when crossed with D.C. 1568 and with D.C. 1341/6 but not when crossed with D.C. 1617, D.C. 657/1 or D.C. 865/3. Evidently Kruglik 021 has peculiarities of its developmental phases which are not revealed by the method of phasic analysis as applied here.
Again, while D.C. 1617 crossed with I. 13132 gives winter and spring types in $F_2$ with sharply delimited periods of heading, D.C. 1568 and D.C. 1341/6 crossed with I. 13132 give $F_2$s in which the heading periods of the winter types starts immediately after that of the spring types. But the phasic analysis offers no explanation of this difference of D.C. 1617 from D.C. 1568 and D.C. 1341/6.
The conclusion is reached that the methods of phasic analysis need to be elaborated and improved.

465. Kugler, W. F. and
Foucault, S. 633.16:582(82)
Descripción de variedades agrícolas de cebada forrajera y cervecera por sus caracteres morfológicos. (**Description of agricultural varieties of feeding and malting barley by their morphological characters**).
"Granos" Semilla Selecta, B. Aires 1939 : **3** : 150–68.
Five varieties are described and illustrated, with indications of their origin and a diagnostic key. Growth habit, pubescence of leaf sheath, leaf characters, pigmentation of stems, auricles, leaves and awns, position of ears, characters of the ear and grain and dormancy period are the characters employed.

## MILLETS AND SORGHUM 633.17

466. Marušev, A. I. 633.17:581.6
**(Methods and investigations of the technological qualities of millet and sorghum).**
Socialistic Grain Farming, Saratov 1940 : No. 5 : 74–80.
The author describes apparatus for testing the meal extraction percentage; the quality of the meal, the ease with which it cooks (water absorption) and the quality and flavour of the product were also determined for a number of selected varieties. The new white-grained selections have proved the best in quality. The results of chemical analysis of some imported species of sorghum and millet are given, together with results of quality estimations; 10% of sorghum flour could be mixed with wheat flour without deterioration in quality.

467. Viégas, G. P. 633.174:575.42(81)
A seleção do sorgo vassoura. (**Selection of broom corn**).
Bragantia, São Paulo 1941 : **1** : 177–232.
Sorghum heads are largely imported into Brazil for the manufacture of brooms. The type of panicle desired and a number of commonly occurring hereditary defects are described. A number of varieties introduced from abroad have been subjected to mass selection over a period of years but little effect was observed as regards the frequency of the defects twisted panicle, pendent (goose-neck) panicle and panicle with thick rachis.
In 1933–34 some 100 selected plants of the local variety were selected and the 17 best panicles were subjected to self-pollination. This process was repeated over a number of years and resulted in a diminution in the percentage of defective panicles. No reduction in vigour, as measured by length of panicle and yield, was detected. The statistical results on which these conclusions are based are presented.

## RICE 633.18

468. 633.18:575(91·4)
Juliano, J. B. 633.18:016(91.4)
**Progress in rice research in the Philippines.**
Philipp. J. Agric. 1941 : **12** : 125–96.
This article includes a short account of rice breeding in the Philippines. In a bibliographical appendix there is a list of 1286 articles dealing directly or indirectly with Philippine rice.

469. MORINAGA, T. 633.18:575.127.2:576.354.4
**Cytogenetical studies on *Oryza sativa* L. IV. The cytogenetics of $F_1$ hybrid of *O. sativa* L. and *O. minuta* Presl.**
Jap. J. Bot. 1940 : **11** : 1–16.
The cross between *O. minuta* ($2n = 48$) and *O. sativa* ($2n = 24$) was successful only with *O. sativa* as maternal parent. Three hybrids were obtained from 1,502 flowers of *O. sativa* pollinated with *O. minuta*. The $F_1$ hybrids are described. They have a very low fertility. At first division of meiosis, the $F_1$ hybrids ($2n = 36$) formed 0–3 bivalents plus 36–30 univalents. Meiosis was extremely irregular. Degeneration of pollen mother cells and the formation of giant cells were also observed, the latter being presumably due to chromosome doubling in the archesporial cells.

470. YASUI, K. 633.18:576.356.52
**Diploid-bud formation in a haploid *Oryza* with some remarks on the behaviour of nucleolus in mitosis.**
Cytologia, Tokyo 1941 : **11** : 515–25.
A plant of sterile rice was grown continuously for some years when in the hot summer of 1939 it produced some partially fertile panicles. The plant was divided into three clones, fertile, semi-fertile and the original sterile. Cytological studies were made on the root tips. The original plant was a haploid with 12 somatic chromosomes in the root tips. The fertile clone had 24 and the root tips of the semi-fertile clone had both diploid and haploid cells, while one root was a sectorial chimaera. The size of the diploid cells was nearly twice that of the haploid. R. M. I.

471. BOBONE, M. 633.18:582
Contribuïção para o estudo e classificação botânica das variedades de "*Oryza sativa*" L. (**Contribution to the study and botanical classification of the varieties of *O. sativa* L.**).
Rev. Agron. Lisboa 1939 : **27** : 272–85.
Latin descriptions are given of the botanical varieties of Indian rices belonging to the collection at the Colonial Agricultural Museum at Lisbon, and a list of the local names of the forms belonging to each botanical variety.

## FORAGE GRASSES 633.2*

472. STEBBINS, G. L. (jun.) and
LOVE, R. M. 633.2:576.312.35
**A cytological study of California forage grasses.**
Amer. J. Bot. 1941 : **28** : 371–82.
The chromosome numbers of 58 species of grasses belonging to 19 genera are reported. The genera are *Bromus, Festuca, Poa, Distichlis, Melica, Agropyron, Elymus, Sitanion, Hordeum, Koeleria, Trisetum, Danthonia, Agrostis, Muhlenbergia, Sporobolus, Oryzopsis, Stipa, Aristida* and *Phalaris*. Intraspecific polyploidy was found in some species. Aneuploid intraspecific variation was indicated in other cases. An aneuploid series of numbers was found in the genus *Stipa*. Of the perennial species of grasses, the drier, hotter regions of California contain a relatively high proportion of polyploids. Most of these are allopolyploids.

473. 633.22–1.557:575.14
SCHULTZ, H. K. 633.22–2–1.521.6
**A study of methods of breeding orchard grass, *Dactylis glomerata* L.**
J. Amer. Soc. Agron. 1941 : **33** : 546–58.
Winter hardiness, disease resistance and self fertility were investigated in strains of orchard grass and in progenies from some of these strains. Winter-hardy plants tended to produce winter-hardy progenies when selfed. Complete resistance to stem rust, *Puccinia graminis avenae*, and to leaf spot was found in some progenies. A wide range of self-fertility occurred

* See also Absts 378 and 387.

between and within progenies. Yield and plant height were much lower in selfed progenies than in the parents of the progenies. However superior clones, which were fully equal to the superior types in progenies obtained by open pollinations, were selected from the selfed progenies. Two promising strains were obtained by means of mass pollination of superior individuals selected from the selfed progenies.

474. Myers, W. M. 633.24:575.127.2:576.354.4
**Meiotic behavior of *Phleum pratense, Phleum subulatum,* and their $F_1$ hybrid.**
J. Agric. Res. 1941 : **63** : 649–59.

Meiosis was studied in *P. pratense* ($2n = 42$), in *P. subulatum* ($2n = 14$) and in two $F_1$ hybrids ($2n = 28$) between them. In *P. subulatum* 99% of the cells had 7 bivalents. In *P. pratense* 33% of the cells had 21 bivalents, 3% had 20 bivalents plus 2 univalents, 35% had 19 bivalents plus 1 quadrivalent, 24% had 17 bivalents plus 2 quadrivalents and 6% had 15 bivalents plus 3 quadrivalents. In the hybrid the frequency of bivalents and univalents varied from 7 bivalents plus 14 univalents to 12 bivalents plus 4 univalents. Lagging univalents and bridges were observed at anaphase in the hybrid. In *P. pratense* two pollen mother cells with 84 and 126 chromosomes at diakinesis were observed. These two cells showed 30 bivalents and 53 bivalents respectively. The $F_1$ hybrids were very similar in morphology to *P. pratense.* They were male sterile but produced 3 seeds per panicle when crossed with *P. pratense.*

475. Shalygin, I. N. 633.263:576.356.5:581.04
**Production of tetraploids in *Lolium* by treating germinating seeds with colchicine.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 527–29.

Tetraploid ($2n = 28$) plants of *Lolium perenne* and *L. multiflorum* were obtained by immersing seeds "at the very first stage of germination" in 0·5% aqueous colchicine solution for 24 or 48 hours. The tetraploids had a very low fertility—4·8% in tetraploid *L. multiflorum* as compared with 64·5% in the diploid and 8·0% in *L. perenne* as compared with 60·0% in the diploid. The tetraploid had a more compact habit of growth, stems and leaves of darker green and eared 1 to 2 weeks later than the diploids.

476. 633.282:581.192
Stoimenow, A. 633.282–1.524(49·7)
**(Content and physiological basis of the production of dhurrin in certain sorghum plants from the standpoint of their utilization as green forage—preliminary communication).**
Rev. Inst. Rech. Agron. Bulg. 1939 : **9** : No. 1 : 17–32.

In view of the drought resistance of *Sorghum vulgare* and its tolerance of unfavourable soil conditions, the possibility of introducing it as a forage plant into Bulgaria is now under consideration.

Chemical analyses of different varieties grown in Bulgaria have shown that all contain the glucoside dhurrin which is injurious to stock. Among the varieties tested Sudan grass contained least.

In studying the relation between the stage of development of the plant and its dhurrin content, it was found that the longer the vegetation period of the variety, the more the glucoside tends to be accumulated in the later stages of vegetation.

477. Parris, G. K. and
Ripperton, J. C. 633.283–2.484–1.521.6:575.1
**Reactions of Napier grass, Merker grass, and their crosses to *Helminthosporium* eye spot.**
Phytopathology 1941 : **31** : p. 855.

The reactions of Napier grass (*Pennisetum purpureum*), Merker grass (*P. Merkeri*), and of selections from open-pollinated Napier, selfed Merker and Napier x Merker crosses to eye-spot

disease caused by *Helminthosporium sacchari* are recorded. Napier grass is susceptible and Merker grass is resistant. Both resistant and susceptible types were obtained from open-pollinated Napier and from the crosses. All the plants from Merker selfed were resistant.

## LEGUMINOUS FORAGE PLANTS 633.3*

478. Albrecht, H. R. and Chamberlain, T. R. 633.31–2.7–1.521.6:575.11
**Instability of resistance to aphids in some strains of alfalfa.**
J. Econ. Ent. 1941 : **34** : 551–54.

Lucerne plants resistant to pea aphid (*Macrosiphum pisi* Kalt) were crossed with susceptible plants and $F_2$ families, along with inbred progenies of the parents, were subjected to severe aphid infestation in the greenhouse in 1936, survivors being retested in 1937. As the results of the two years disagreed it is concluded that resistance is not a stable character. The data given suggest that resistance is at least to some degree heritable.

479. Arutiunova, A. G. 633.32:576.312.34
**Chromosome morphology in certain species of clover.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 825–27.

The chromosome morphologies of three forms of *Trifolium pratense* L. ($2n = 14$), of *T. arvense* L. ($2n = 14$), of *T. incarnatum* L. ($2n = 14$), of two forms of *T. hybridum* L. ($2n = 16$), of *T. montanum* L. ($2n = 16$) and of *T. repens* L. var. *silvestre* ($2n = 32$) were studied. In the wild form of *T. pratense* there were distinguished seven different types of chromosomes. The cultivated forms of *T. pratense* had the same chromosome types as those found in the wild form. The chromosomes of *T. arvense* were similar to those of *T. pratense*. All the species have at least one pair of satellited chromosomes. It is suggested that the chromosome set of *T. repens* was produced by the doubling of a chromosome set similar to that found in *T. hybridum*.

480. Stahmann, M. A., Huebner, C. F. and Link, K. P. 633.366:581.192:575:578.08
**Studies on the hemorrhagic sweet clover disease. V. Identification and synthesis of the hemorrhagic agent.**
J. Biol. Chem. 1941 : **138** : 513–27.

In view of the small amount of coumarin actually involved in the formation of "hemorrhagic hays" and the limitations of the available techniques for coumarin estimation, strains of sweet clover selected by the breeder as possibly having a low coumarin content should be checked by spoilage tests in which the prothrombin assay with standardized susceptible rabbits is used as the control determination.

481. Troll, H.-J. 633.367:581.143.26.035.1:575
Vegetationsbeobachtungen an Lupinen in verschiedenen geographischen Breiten. (**Observations on vegetative growth in lupins in different geographical latitudes**).
Züchter 1940 : **12** : 129–39.

In order to get two crops a year, seeds of plants of *L. luteus*, *L. angustifolius* and *L. albus* grown in Müncheberg during the spring and summer were sown at Sarona, near Jaffa, Palestine in October-November. Details are given of the conditions of soil and temperature and the data of the vegetative growth of the plants in the two districts are tabulated for the years 1934–39.
*L. luteus* and *L. angustifolius* showed an increase of 100% in the length of the vegetative phase in Palestine which is attributed to the difference in length of day for the first season, while in the other years temperature played an important part. Differences in reaction to the external conditions, which are probably heritable, were noticed in strains of *angustifolius* and *albus*.
R. M. I.

* See also Absts 387 and 443.

482. SENGBUSCH, R. v. 633.367:581.192:581.47:575.116.1
Die Züchtung von Süsslupinen mit nichtplatzenden Hülsen. Die Kombination der Eigenschaften "Alkaloidfrei" und "Nichtplatzen der Hülsen" und die Bedeutung der doppelt und dreifach recessiven alkaloidfreien Formen für die Süsslupinenzüchtung. (**The breeding of sweet lupins with non-splitting pods. The combination of the characters "freedom from alkaloid" and "non-splitting of the pods" and the importance of the double and triple recessive alkaloid free forms for sweet lupin breeding**).
Züchter 1940 : **12** : 149–52.

Crosses were made between non-splitting, bitter, light-seeded strains with the formula, *Dul Am inv parv* and the alkaloid-free strains 8 and 80 with the formulae *dul Am Inv parv* and *Dul am Inv parv* respectively. Dulcis (*dul*) is the gene for alkaloid-free in strain 8, amoenus (*am*) the gene for alkaloid-free in strain 80, invulnerabilis (*inv*) the gene for non-splitting in strain 3535A, parvimaculatus (*parv*) the gene for lightly speckled testa colour. A complete genetical analysis was not the main object of these crosses, but it was important for the combination of the characters non-splitting and sweet to be able to determine whether there existed strong linkage between bitter and non-splitting on the one hand and sweet and splitting on the other.

No linkage was found between *inv* and *dul* and only a very weak linkage between *Am* and *inv*. It is pointed out that to obtain the best results with regard to yield, it is necessary to continue the selection of the sweet, non-splitting types at least into the $F_3$.

It is also considered desirable to search for individual plants possessing only one gene for absolute freedom from alkaloid. R. M. I.

## ROOTS AND TUBERS 633.4

483. 633.41:575.11
ABEGG, F. A. 633.63:575.11
**List of characters and gene symbols reported for the species *Beta vulgaris* L.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 109–13. (Mimeographed).

A list of over 20 genes now known in *Beta vulgaris* is given, together with a list of authorities. One linkage group of nine genes is known, the *R* group. Of the remaining factors eight are known to be independent of this group and no linkage data are available for four.

484. SCHWANITZ, F. 633.41:581.162.31:581.162.5:575.127.2
Beiträge zur Züchtung und Genetik selbstfertiler Rüben (*Beta vulgaris* L.). I. Erste Ergebnisse von Kreuzungen zwischen selbststeriler *Beta vulgaris* L. und selbstfertiler *Beta maritima* L. (**On the breeding and genetics of self-fertile beets (*Beta vulgaris* L.). I. Preliminary results of crosses between self-sterile *B. vulgaris* L. and self-fertile *B. maritima* L.**
Züchter 1940 : **12** : 167–78.

Plants of a number of varieties of cultivated beets were grown and the flowers isolated for the selection of self-fertile strains. All degrees of self-sterility and self-fertility were found and it is noted that the self-fertility of the partially self-fertile plants was much affected by external conditions. The one plant with 100% fertility was not affected by changes in the external conditions.

An analysis of the $F_1$ of a cross between a self-sterile beet and this self-fertile plant, suggested that self-fertility is probably mono- or bi-factorial.

Crosses were also made between a fully self-fertile strain of *Beta maritima* from Anatolia and varieties of *B. vulgaris* for the creation of fully self-fertile strains.

The *B. maritima* forms no swollen root but immediately sends up a flowering shoot. As the flowers were very small, the culivated varieties of *B. vulgaris* were used as the mother plants. The $F_1$ plants differed from *B. maritima* only in the colour of the root, which unlike both parents was red, and in the larger size of the flowers.

The $F_1$ was both selfed and back-crossed to the different parents. An analysis of the $F_2$

showed a bi-factorial inheritance of root colour and of self-fertility and a monofactorial inheritance of shooting in the first year and the red coloration of the veins. The author then gives a brief review of the literature on the question of the self-sterility of *B. vulgaris*.

R. M. I.

485. STEVENSON, F. J. 633.491:575

**Potato breeding, genetics, and cytology : review of literature, 1940.**

Amer. Potato J. 1941 : **18** : 317–29.

The headings of the several sections of this review are —varieties, methods, potato breeders, tuber quality, stoloniferousness, graft hybrids, colchicine treatments, disease resistance, resistance to viruses, resistance to late blight, resistance to common scab, resistance to Fusarium, wart resistance, resistance to animal parasites and cytology. It is acknowledged that "much of the material in this report, especially that concerning articles written in foreign languages, was taken from the abstracts published by the Imperial Bureau of Plant Genetics, Cambridge, England."

486. IVANOV, V. I. 633.491:575.127.2:576.312.35

**A cytological survey of the reciprocal hybrids of the potato (*Solanum Antipoviczii* Buk. x *S. tuberosum*) x *S. tuberosum* L.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 51–54.

The chromosome numbers of seedlings from the back-cross $F_1$ (*S. Antipoviczii* x *tuberosum*) x *tuberosum* were found to range from $2n = 56$ to $2n = 65$, the commonest number being 60–61. Seedlings from the back-cross $F_2$ (*S. Antipoviczii* x *tuberosum*) x *tuberosum* had somatic numbers varying from 48 to 65, the majority of seedlings having from 58 to 61 chromosomes. Seedlings from the double back-cross—[$F_1$ (*S. Antipoviczii* x *tuberosum*) x *tuberosum*] x *tuberosum*—had chromosome numbers of from $2n = 48$ to $2n = 59$, the majority of plants having a somatic number between 50 and 53. Lagging and dividing univalents were observed at meiosis in these hybrids. Forms which might be of use to the breeder were found only among the plants with the lower chromosome numbers (i.e. approaching $2n = 48$). In crosses between *S. demissum* and *S. tuberosum* it has also been found that the *Phytophthora*-resistant forms which have been selected for domestic characters have a chromosome number of $2n = 48$.

487. PERLOVA, R. L. 633.491:576.312.35:581.163

**Spontaneous occurrence of diploid plants in the offspring of the triploid *Solanum Maglia* Schlechtd. grown in the Pamirs.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 710–13.

The triploid ($2n = 36$) potato, *S. Maglia*, which is sterile when grown at Leningrad, set berries when grown at 2320 metres above sea level in the Pamirs. One plant yielded 15 berries; 5 of the berries were seedless and the other 10 contained 49 seeds. Only 13 of these seeds, however, were well filled. Three seedlings grown from these seeds had a chromosome number of $2n = 25$ or 26. These unbalanced diploid seedlings were very similar morphologically to their triploid parent. The majority of quantitative characters were smaller in the diploids than in *S. Maglia*. It is suggested that the diploid seeds were produced by parthenogenesis.

488. RYBIN, V. A. 633.491:576.356.5:581.04

**Tetraploid *Solanum Rybinii* Juz. et Buk. produced by colchicine treatment.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 151–54.

From 100 seeds of *S. Rybinii* germinated in 0·4% colchicine solution for 6 days there were obtained 13 plants of which 5 had dark green colour, large cells in the leaves, broad and deep leaf lobes and large, non-uniform pollen grains. Two plants of this group were examined cytologically and found to have 24 bivalents, whereas a normal colchicine-treated plant had 12, the characteristic number for *S. Rybinii*.

The author was unsuccessful in attempting to induce chromosome doubling by immersing tuber sprouts in colchicine, as they were killed by immersion either in colchicine or water. The seeds for the above experiment were obtained from exceptional berries set on normal shoots developed from a tuber on which other shoots had been subjected to immersion in colchicine solution and had died. The clone of *S. Rybinii* used does not normally set seed.

Some of the diploid seedlings however were quite fertile and one of the tetraploids also formed berries, though not early enough to ripen them before being killed by frost.

489. Clarke, A. E., Edmundson, W. C. and Lombard, P. M. 633.491:581.16:577.17
**Seed-setting in potatoes as affected by spraying with a-naphthaleneacetamide and by light.**
Amer. Potato J. 1941 : **18** : 273–79.

Spraying potato plants with dilute concentrations of α-naphthaleneacetamide was not effective in increasing flower or berry production of the varieties—S 245–25, Sebago, Irish Cobbler and Earlaine. Sebago and Irish Cobbler produced more berries at Greeley than at Beltsville (this may be due to less cloudy weather at Greeley during the winter months) while S 245–25 produced the same number of berries at both places.

490. Perlova, R. L. 633.491:581.162.5:576.356.5
**Production of tetraploid plants in triploid potato species, group *Andigena*, by cultivating in the Pamirs.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 55–58.

Three triploid ($2n = 36$) species of potatoes—*Solanum tenuifilamentum*, *S. mamilliferum* and *S. cuencanum*—which are sterile when grown under lowland conditions at Leningrad, were found to be fertile when grown at 2,320 metres above sea level in the Pamirs. Berry production in the Pamirs takes place late in the autumn. The chromosome numbers of seedlings from all three species were found to be $2n = 48$–50. Segregations for certain characters were observed in the seedling progenies. Many of the seedlings were fertile. It is suggested that the segregations in the progenies support Bukasov's hypothesis as to the hybrid origin of the triploid species in the group *Andigena* from crosses between *S. andigenum* and diploid species such as *S. stenotomum*.

491. Krantz, F. A. and Eide, C. J. 633.491–2.3–1.521.6:575.11
**Inheritance of reaction to common scab in the potato.**
J. Agric. Res. 1941 : **63** : 219–31.

The reaction to common scab (*Actinomyces scabies*) of $F_1$, $F_2$ and $F_3$ progenies from the cross Accession 123 (an unidentified clone found as a rogue in a field of Irish Cobblers) x Lookout Mountain and of selfed progenies from 118 other varieties and selections was studied. Depth and severity of scab lesion were used as the measure of susceptibility. Assuming that the type of inheritance in the potato was autotetrasomic and that the differences observed in reaction to common scab were principally due to the influence of one gene, the segregates from the cross Accession 213 x Lookout Mountain were classified into five breeding types. The distribution of the segregates of the five breeding types in the $F_1$, $F_2$ and $F_3$ generations approached that calculated on the hypothesis that Accession 213 was triplex and Lookout Mountain simplex for a gene *Sc* influencing reaction to scab. The five breeding types are *Sc Sc Sc Sc, Sc Sc Sc sc, Sc Sc sc sc, Sc sc sc sc* and *sc sc sc sc*. The 118 varieties and selections were also classified from tests of their selfed progenies into these five breeding types. Four degrees of severity of scab were recognized –0 = no scab and 4 = most severe scab. In the Accession 213 x Lookout Mountain results the mean scab rating of progenies from breeding type 1 was 0·67, from type 2–1·13, from type 3–1·52, from type 4–2·11 and from type 5 it was 2·47. The mean scab ratings of selfed progenies from the varieties and selections varied from 1·00 to 4·00. Of the cultivated varieties Hindenburg belongs to breeding type 1 and is very resistant to scab while Chippewa, Early Ohio, Triumph and Warba belong to type 5 and are highly susceptible to scab. An association between mean scab reaction and the factor *P* for purple v. red tubers was observed in 13 crosses. The mean scab reactions of *P* and *p* plants were 2·49 and 1·99 respectively.

492. Sleesman, J. P. and Stevenson, F. J. 633.491–2.7–1.521.6:575
633.491–2.411.4–1.521.6:575
**Breeding a potato resistant to the potato leafhopper.**
Amer. Potato J. 1941 : **18** : 280–98.

Hopperburn reaction (injury to the leaves caused by the leafhopper, *Empoasca fabae*) of potato

seedlings was determined in progenies from crosses involving the following parents—Katahdin, President, Ackersegen, Earlaine, 3897–90 (a blight resistant early selection obtained by K. O. Müller) and Albion. Evidence of genetic segregation for degree of reaction was obtained. As the chief interest from the breeding standpoint is the development of new varieties resistant to both late blight and hopperburn, a number of progenies were tested for both these characters. Of 14 progenies tested, three showed a small but significant positive correlation between resistance to late blight and resistance to attack by leaf-hopper and one showed a negative correlation. Leafhopper nymphal population counts were also made. The correlations between nymphal populations and degrees of hopperburn were not significant. Significant differences in amount of hopperburn and in nymphal populations occurred between varieties. A number of seedlings were much more resistant and some were more tolerant to attack by leafhopper than were any of the old commercial varieties.

## FIBRES 633.5*

493. 633.5–1.524(48.5)
GRANHALL, I. 633.52:575(48.5)
Odling av spånadsväxter. (**Growing textile plants**).
K. LandtbrAkad. Tidskr. 1941 : **80** : 124–34.

An account of the history and economic development of the cultivation of flax and hemp in Sweden.

In emphasizing the importance of choosing good types of superior quality, the flax varieties Herkules and Blanda bred by the Svalöf Station are mentioned as being respectively suitable for the southern and northern districts of Sweden. Both varieties are outstanding in quality. Advances in the processing of flax and hemp and state and other financial support to promote the production of textile plants and improve quality are described.

494. EL-KILANI, M. A. 633.51:575(62)
**(New varieties of cotton).**
Special Suppl. Egypt. Agric. Mag. 1941 : 19–24.

The author, reviewing the work that has been done by the plant breeding section on cotton improvement, outlines the methods used. The first is by selection within the prevailing varieties to produce new strains or varieties which exceed the originals in yield and quality. The second is by hybridization, natural or artificial, to develop new varieties which surpass the parents. Since the occurrence of natural hybridization is rare and its results are uncertain, the plant breeder relies on artificial hybridization to produce new varieties which combine the best qualities of the parents. The author continues by describing the new varieties produced by these two methods.

Malacki, Karnack and Giza 36 were produced by artificial hybridization and Giza 31 by selection. However these varieties are not yet on the market and are still under propagation.

Malacki is a hybrid from Sakha 10 and Sakel, with staple length 39–40 mm., ginning out-turn and yield equal to Sakel, fibre colour like Maārad, remarkable spinning qualities and susceptible to wilt disease.

Karnack is a hybrid from Maārad and Sakha 3 (selected from Sakel); fibre colour is slightly dark; yield and ginning out-turn are higher than any other long staple varieties, staple length 37 mm.; resistant to wilt disease, and spinning qualities equal those of Sakel.

Giza 36 is a hybrid from Giza 12 and Sakha 3, combines high yield and high ginning out-turn (10% higher than Sakel), staple length 36 mm., spinning quality is as good as that of Sakel; and highly immune against wilt.

Giza 31 was selected from Ashmouni, exceeds the latter in yield and fibre qualities and is early maturing and resistant to the high temperature of upper Egypt. A. I.

495. BEASLEY, J. O. 633.51:575.127.2:576.356.5
**Hybridization, cytology, and polyploidy of *Gossypium*.**
Chronica Botanica 1941 : **6** : 394–95.

Part of this brief review is concerned with work previously published by the author (cf "Plant Breeding Abstracts", Vol. X, Absts 795, 1062 and 1063).

From chromosome behaviour at meiosis in hybrids it is concluded that the 13-chromosome

* See also Absts 377 and 379 (Cotton).

species comprise five types. The chromosomes of different types have numerous structural differences.
All types are more closely related to the Asiatic type (*G. arboreum* L. and *G. herbaceum* L.) than to each other. The Australian (*G. Sturtii* F. Muell.), African (*G. anomalum* Wawra. and Peyr.), and American types (*G. Thurberi* Tod., *G. Davidsoni* Kellogg, etc.) are more closely related to the Asiatic type than is the Arabia-India type *G. Stocksii* M. Mast.
Haploid-diploid twins such as frequently occur in *G. barbadense* have been found, though extremely rarely, in *G. hirsutum*. The haploids of the latter have a maximum of 5 bivalents. A number of pure lines have been produced by doubling the chromosomes of haploids.

496. 633.51:575.183:581.6
FULTON, H. J. 633.51:581.6:519.241.1
**Some factors that influence the immediate effects of pollen on boll characters in cotton.**
J. Agric. Res. 1941 : **63** : 469–80.
The effect of pollen on the five boll characters, number of seeds, seed index, lint index, fibre length and boll-maturation period, was investigated by comparing bolls from Acala (*Gossypium hirsutum*) x other Acala plants of the same inbred strain with bolls from the two interspecific crosses, Acala x Pima (*G. barbadense*) and Acala x Hopi (*G. Hopi* Lewton). Correlation coefficients were calculated for the correlations between the four characters, seeds per boll, seed index, lint index and fibre length, for all three pollinations. The effect of different seasons, day of anthesis and pistillate plants used as parent on the expression of the five characters was also investigated. It is concluded that effects upon the expression of the characters caused by different years, different days of anthesis in the same year and the different individual plants used as pistillate parents are so great as to mask completely the effects, if any, of different pollens. Further analysis suggested that a "nutritional" factor affected seed index, fibre length and probably lint index and that differences among the several pollens in their ability to fertilize a high percentage of ovules was a factor that determines the effects of cross-pollination.

497. ZHURBIN, A. I. 633.51:576.356.5:581.04
**Polyploids in cotton experimentally produced by colchicine treatment.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 524–26.
A male-sterile but female-fertile amphidiploid shoot was obtained by treating a shoot of the hybrid *Gossypium arboreum* var. *neglectum* W. x *G. Thurberi* Tod. with colchicine. Amphidiploids ($2n = 104$) have also been obtained by colchicine treatment of germinating seeds of *G. hirsutum* x *G. barbadense*. These amphidiploids were partly fertile. A triploid plant ($2n = 78$) was also obtained but it is suggested that this was due to the union of an unreduced gamete with a reduced one and not to the colchicine treatment.

498. FLOR, H. H. 633.52–2.452–1.521.6:575.11:576.16
**Inheritance of rust reaction in a cross between the flax varieties Buda and J.W.S.**
J. Agric. Res. 1941 : **63** : 369–88.
The $F_1$ plants from the cross Buda (susceptible to race 4, immune to race 7) x J.W.S. (immune to race 4, susceptible to race 7) were immune to both races 4 and 7 of flax rust (*Melampsora lini*). The $F_2$ showed a ratio of 3 immune to 1 susceptible for the reaction to race 4 and no definite ratio for reaction to race 7 (297 plants immune, 18 resistant and 33 susceptible). All plants susceptible to race 4 were immune to race 7. The 51 plants either resistant or susceptible to race 7 were immune to race 4. Most plants (209 out of 348) were immune to both races. Each of the 165 $F_2$ plants tested was immune from race 20 (both parents are immune from this race) and all plants tested reacted the same to race 19 as to race 4 (Buda is susceptible and J.W.S. resistant to race 19). The reactions of 348 $F_3$ lines to races 4 and 7 were also determined. The 175 $F_3$ lines heterozygous for reaction to race 4 were also heterozygous for reaction to race 7. All plants of 41 lines were either susceptible to one race and immune from the other or immune from both. Each of the remaining 134 lines contained plants having a distinctly resistant reaction to race 7. These results mean that the factor for immunity from race 4 found in J.W.S. belongs to the same allelic series as the factor for

immunity from race 7 found in Buda and that Buda also carried a factor for resistance to race 7, this latter factor being independent of and hypostatic to the immunity from race 7 factor. The reactions of $F_2$ plants and $F_3$ lines to race 3 were also investigated. The factor for semi-resistance to race 3 found in Buda appears to be incompletely dominant to susceptibility and to be independent of the immunity factors. Plants of the $F_3$ lines were also tested with races 1, 2, 5, 8, 9, 10, 16, 19, 20, 21 and 22. The following symbols for the factors are suggested—$L^1$ (susceptibility to race 4, immunity to race 7), $L^2$ (immunity to race 4, susceptibility to race 7) and $R$ (semi-resistance to race 3 and resistance to race 7). On this basis the genotype of Buda is $L^1L^1RR$ and that of J.W.S. $L^2L^2rr$.

499. Grechukhin, E. I. and Belovitskaya, N. A. 633.522:577.8:575.1
**Monoecious hemp.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 42–46.

In a previous paper (see "Plant Breeding Abstracts", Vol. X, Abst. 802) the authors have shown that there is a great variation in the degree of expression of monoeciousness in hemp. The whole of this diversity is now classified into two series, female and male. The female series includes all the monoecious plants of the female type (showing strong, medium and slight degree of expression), monoecious plants of the feminized type (also showing three degrees of expression), the ordinary females and the unisexual feminized male plants.

In studies on the inheritance of monoeciousness it was found that in the first generation (obtained from open-pollinated seed of monoecious plants growing in mass cultures) male and female plants usually predominate but that in subsequent generations produced by crossing monoecious plants with each other there occurs a slow accumulation of monoecious plants and an increase in their diversity. Further details are given of the results of selection for monoeciousness in later generations of the female series. It has been possible to obtain some stocks which produce populations consisting mainly of monoecious plants of the feminized type, some stocks which produce mainly monoecious plants of the female types and rarely other stocks which contain equal numbers of female and feminized types. Unisexual forms were entirely lacking from these progenies.

500. Pasković, F. 633.522–1.524(49.7)
**(Morphological and biological investigation of some of our varieties of hemp).**
Arhiv Minist. Poljopr. 1939 : **6** : No. 14 : 62–82.

The Jugoslav hemps used in these experiments can be grouped into one Russian type, Potočka and the local varieties Osječka, Apatinska, Leskovačka, Beljska and others of the Italian type. Varietal differences are reported with regard to: growth rhythm; yield of stem; ratio of male to female plants; stem height; number and length of internodes; thickness of stems; correlation between height and thickness of stems; weight of stems; and variability in these various features.

The ratio of male to female plants was found to vary from year to year and cannot therefore be regarded solely as a varietal characteristic.

Varietal differences were noted in respect of plant height.

The length of flowering region in proportion to the remainder of the stem was relatively greatest in Potočka (42%), and lowest in Osječka (25%). The latter therefore gives the highest yield of fibre.

Varieties in which the length of stem from cotyledon to flower region is greatest have the longest internodes and hence give the highest fibre yields.

Varieties with the thickest stems give the greatest yield of fibre.

The ratio between height and thickness of the stem is highest in the Beljska type, which differs from the others in its shorter and thinner stems; this ratio is also higher in male than in female plants.

A positive correlation was observed between height and thickness of stem.

Yield of stem is regarded as more important than fibre percentage and is greatest in the varieties Bologna and Leskovačka, and least in Potočka.

501. Tschaneff, K. 633.522–1.524(49.7)
**(Biometric investigation of the hemps distributed in Bulgaria).**
Rev. Inst. Rech. Agron. Bulg. 1938 : **8** : No. 3 : 33–51.

The relation between morphological characters of the stem in hemp and the yield and quality of the fibre is discussed with reference to the determination of the botanical and technical length of the stem and the importance of these characteristics in selecting hemp for improved fibre production.
Samples of Bologna hemp and also Serbian and local Bulgarian hemps were obtained in 1931 from populations in the regions of Pazardžiško, Pazardžik and Radomirsko respectively. The method used in the biometric analysis of the morphological and other features of the plant and its stems and their internodes in particular (as characters of special importance in hemp improvement) is described in detail.
The results showed that the Bologna hemp was far superior in fibre to either the Serbian or the local Bulgarian forms and these differences in quality are hereditary and should therefore receive much more attention from the grower in Bulgaria.

502. Scharonoff, W. A. 633.525.1–1.524:575(47)
**(Wild ramie in Kolkhida. Its history, investigation and introduction into breeding work).**
Trudy Botaničeskogo Sada, Moscow 1941 : No. 4 : 61–118.

A number of plants of *Boehmeria nivea* that had survived in the wild and semi-cultivated state from previous introductions made over 50 years ago were regarded as interesting on account of their complete ecological adaptation. A thorough study was made of plants collected in various parts of the Black Sea region. The plants and the conditions in which they were growing are described.
Clones formed from the different plants differed in number of branches per plant at a given age, degree of pubescence of the leaves, the proportion of male and female flowers, the length of the inflorescences, etc.; the presence of hermaphrodite flowers, some containing seeds, was noted in some male inflorescences.
Differences between the clones were observed also in respect of vegetative period, e.g. the date of appearance of the first inflorescence, and of the time of flowering of the male and female inflorescences; in some clones the two flowered together and in some the female inflorescences were 30–40 days behind the male.
Stem height differed in different clones and was more variable within the clone in some clones than in others. Variation from clone to clone was observed in respect of number of nodes per stem and height of insertion of male inflorescences; this latter character varies in the course of development and is of no value for diagnostic purposes.
Some of the clones were quite high in fibre content, others were much lower. On the basis of differences in earliness, fibre content, branching, leaf form, plant colour and other characters, 11 types were established and are described. The best types are being used for breeding.

## SUGAR PLANTS 633.6*

503. Suzuki, E. 633.61:576.356
**Cytological studies of sugar cane. I. Observations on some P.O.J. varieties.**
Cytologia, Tokyo 1941 : **11** : 507–14.

The varieties investigated were:—P.O.J. 2725, 2722, 2878, 2883, and 2364.
P.O.J. 2725 showed usually $50_{II}$ and $7_{I}$ plus one fragment and P.O.J. 2722 showed usually $50_{II}$ and $8_{I}$ plus one fragment.
It is suggested that as both these forms are derived from the same cross (P.O.J. 2364 x E.K. 28) the fragment chromosome may have the same origin. P.O.J. 2878 showed usually $54_{II}$ and $7_{I}$ or $55_{II}$ and $5_{I}$, i.e. $2n = 115$. P.O.J. 2364 had $67_{II}$ and $14_{I}$, $2n = 148$.
*S. spontaneum* L. *alas* Karenko showed invariably $48_{II}$. R. M. I.

* See also Abst. 379 (Sugar cane) and Abst. 482.

504. 633.61–2.8–1.521.6
BRANDES, E. W. 633.63–2.484–1.521.6
**Research on sugar plants and some practical adaptations.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 158–65. (Mimeographed).
This address has already been reviewed from another source (cf. "Plant Breeding Abstracts", Vol. X, Abst. 958).

505. MORIYA, A. 633.61:575.127.5:633.174
**Contributions to the cytology of genus *Saccharum*. I. Observations on the $F_1$ progeny of sugar cane and sorghum hybrids.**
Cytologia, Tokyo 1940 : **11** : 117–35.
The three types of $F_1$ hybrids used in the cytological study are described. The normal or sugar cane type closely resembles the sugar cane in external appearance; the second type is very short and is called the dwarf or terato type; while the third is intermediate.
The sugar cane variety, P.O.J. 2725, was used as the female parent in all the original crosses and a number of varieties of *Sorghum vulgare* were used as male parents.
The somatic chromosome number of the sugar cane variety was $2n = 107$. 49–58 chromosomes were counted in polar views of first metaphase, due to the formation of univalents as well as bivalents and multivalents. In the tetrad stage most P.M.C.'s formed triads, true tetrads were rare and the pollen grains were completely sterile.
In all the sorghum varieties used $2n = 10$.
The $F_1$ of the normal type showed $2n = 118$. It is suggested that this represents a doubling of the maternal chromosomes.
Observations on meiosis were made on only one individual. Univalents, bivalents and polyvalents were counted. The pollen grains were sterile. In the dwarf type $2n = 64$; the plants died before meiosis could be studied. The intermediate type of $F_1$ also had $2n = 64$. At meiosis more than ten univalents were observed as well as a large polyvalent. No fertile pollen was formed. R. M. I.

506. 633.61.0015(92)
633.61:582:578.08
Verslag der cultuurafdeeling van het proefstation voor de Java-Suiker-Industrie te Pasoeroean over het jaar 1940. (**Report of the crop section of the Java Sugar Industry Experiment Station at Pasoeroean for 1940**).
Soerabaja 1940 : Pp. 28.
Advisory work in connexion with experiment plots and the planning of experiments was mainly concerned with the application of Fisher's methods.
Inspections were made of trials of new varieties and of crosses produced under the extension work on selection that is in progress in various localities.
Comparative studies of the root systems of different varieties of cane under different environment were carried out to ascertain, *inter alia*, their possible range of cultivation.
The ripening process of the promising new varieties was compared with that of the most important varieties grown by planters.
Work on cane improvement and cytology carried out during the year included the completion of large scale experiments begun in 1939 with colchicine. The records relating to crosses that had been made in past years were collected, including basic crosses and also hybridizations on estates.
When the hybridization season began pollen was collected in some instances for the serum analysis research of Dr F. H. Heege at Semarang.
Large numbers of cane determinations involving 20 varieties were made in 1940 in connexion with the certification of authenticity or of diseases.
No varieties were offered for registration under the Royalty Association [Royaltyvereeniging].
Much time was devoted to the description of cane types and various improvements in the methods used were adopted, including the employment of comparisons of preparations of epidermis of noble and wild canes as an aid to identification (as is done in America in plant breeding).
The statistical evaluation of the various data collected was also carried on.

507. Siegumfeldt, G. H. 633.63:575
**Progress in genetics—new methods in plant breeding.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 155–57. (Mimeographed).
In this review (which is presented as condensed by A. W. Skuderna) the topics breeding for resistance, heterosis, polyploidy, are discussed with special reference to sugar beet breeding. It is mentioned that in collections of spores of *Cercospora beticola* from five countries, four different physiological races were found.

508. Doxtator, C. W. 633.63:575(78.8)
**Breeding methods with sugar beets : greenhouse and field technique.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 141–43. (Mimeographed).
In the breeding work of the American Crystal Sugar Company at Rocky Ford, Colorado, mass selection, mother line breeding and inbreeding are used. Greenhouses have been found extremely useful in speeding up varietal improvement, seed being obtained within a year after sowing or even less.
In mass seed increase beets are selected for leafspot resistance in the field, for root type at harvest and for percentage sucrose during winter storage.
Inbred lines are started by bagging branches of selected plants and are tested for resistance to leafspot in a nursery subjected during the summer to periodic overhead sprinkling at night. Crosses are made between pairs of inbred lines and if the combination appears promising the lines are increased.

509. Brewbaker, H. E. 633.63:575:578.08
**Principal features of the seed accession system in use by the Great Western Sugar Company.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 181–84. (Mimeographed).
A brief, illustrated account of a method of numbering and recording seed lots.

510. 633.63:575:578.08
Doxtator, C. W. 633.63–1.421:519.271.3
**Harvest sampling studies with five varieties of sugar beets.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 103–06. (Mimeographed).
At Rocky Ford, Colorado, information from variety trials harvested at the normal harvest date (about October 10) is obtained too late for the autumn sowing of increase plots, the latest safe date for this being September 5. Hence it would be useful to be able to estimate the final performance of varieties by pre-harvest sampling.
In a replicated trial of five varieties sub-plots were harvested at intervals from August 23 to November 1. It was found that no significant changes in relative performance of the five varieties occurred over this period. It is concluded that data from pre-harvest samples may safely be used.

511. Coons, G. H. et al. 633.63:575.12
**Report of 1939 tests of U.S. 200 x 215.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 165–68. (Mimeographed).
U.S.200 is an inbred line highly resistant to leaf spot, high in sucrose and moderate in yielding capacity and U.S.215 is an inbred moderately resistant to leaf spot, moderately high in sucrose and of very high yielding capacity. Seed of these two lines mixed in the proportion of 1 of U.S.200: 3 of U.S.215 was sown by the Western Seed Production Corporation in Arizona and the seed obtained from this planting, having an unknown proportion of hybrids, is termed U.S.200 x 215.
Extensive tests in different states have shown that U.S.200 x 215 may be used to replace European brands in common use without reduction in sugar yields and with increased yields under conditions of leaf spot exposure. In many of the tests the control was sown with the seed obtained from a planting of a mixture in equal quantities of 9 European brands.

512. Deming, G. W. 633.63:575.12
**Comparison of some advanced generations of a hybrid strain of sugar beet with the original third generation selection.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 149–54. (Mimeographed).
From the $F_2$ of a cross between a sugar beet type and a red garden beet, roots were selected for

white flesh, shape and gross sugar per root. The seed produced from these roots has been called Hybrid Strain 520. This strain in extensive tests has given higher yields of beet and about the same acre yield of sugar as commercial varieties.
It has been multiplied without selection, with selection for sucrose percentage, with selection for local adaptation and has also been crossed with a commercial variety. The performance of these different increases was studied and the conclusion is tentatively advanced that it may be possible to increase such a hybrid without selection after the third and fourth generations and without material loss occurring in yielding capacity in terms of gross sugar per acre.

513. Lynes, F. F. and
Cormany, C. E. 633.63:575.12
**Studies on some $F_1$ sugar beet hybrids.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 185–90. (Mimeographed).
In crosses between single plants, made by bagging together branches of each, there was a tendency of the $F_1$ to resemble the pollen parent more often than the seed parent. In other crosses, where the general economic characters of the $F_1$s were evaluated by inspection, it was found that parents gave progenies of different performance depending on whether they were used as seed or as pollen parents. In general better yielding hybrids are likely to be obtained by using the heavier yielding of the two types crossed as the seed parent.
Crosses were also made by sowing mechanical mixtures of seed of several varieties, the seed harvested from such a mixed planting being termed a genetic mixture. Several mechanical and genetic mixtures were tested in quasi-factorial experiments in 1938 and 1939 and their actual performances were compared with the arithmetic and weighted averages of the varieties involved. It was concluded that, with few exceptions, the arithmetical average (which did not differ significantly from the weighted average) serves as an index to the performance of mechanical or genetical mixtures.

514. Bonne, C. 633.63:575.12:633.41
Die Züchtung von Rüben zur Verwendung als Zucker- oder als Futterrüben.
(**The breeding of beets for use as sugar or fodder beets**).
Zuckerrübenbau 1941 : **23** : 25–30.
The great importance of beets as a fodder crop in Germany is discussed with observations on the gradation in root type and growth habit of mangels and sugar beets as well as their differences in anatomical structure and in yield of leaf. The relative merits of the two crops are also considered with reference to economic requirements and methods of cultivation in present day Germany. It is shown that by hybridization of sugar beets with fodder beets, sugar beet types can be obtained in which the root grows well out of the soil, while retaining the characteristics of the sugar beet. Sugar beets of this kind greatly facilitate harvesting and in addition the foliage can be harvested practically free from soil, a point of particular advantage in feeding stock.

515. Dahlberg, H. W. 633.63:575.127.2
**A study of sugar beet hybrids.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 143–44. (Mimeographed).
Wild *Beta maritima* from the North Sea coast was crossed with a variety bred by the Great Western Sugar Company and selected $F_1$ plants were back-crossed with the commercial strain G.W.3642. Tested in comparison with the Great Western standard variety, the bulked progeny of these back-crosses showed a slightly higher yield of beets and about the same total sugar. The root type is satisfactory and they have good resistance to leaf spot. Several hundred second back-cross families are being tested for performance and it is believed that many of them will show promise as commercial varieties.

516. Abegg, F. A. 633.63:576.356.5:581.04
**The induction of polyploidy in *Beta vulgaris* L. by colchicine treatment.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 118–19. (Mimeographed).
As shown by pollen grain measurements and confirmed by chromosome counts in pollen mother cells, tetraploid sectors were produced on plants which had been treated in the seedling stage with 0·2 or 0·4% colchicine, applied as single drops to the growing point on four to eight

successive days. Both tetraploid and triploid progeny were obtained from the treated plants. In two of the stocks used the polyploid progenies differed from the diploid in germination rate, seedling size, leaf shape, flowering habit and amount of seed set. In another stock there was no consistent difference in size of plant between polyploids and diploids.
Polyploidy has also been induced by soaking seed in 0·4% colchicine for 8 hours, 1, 2 and 3 days; the criterion in this case was pollen grain size.

517. ARTSCHWAGER, E. 633.63:576.356.5:581.04
**Indications of polyploidy in sugar beets induced by colchicine.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 120–21. (Mimeographed).

The author has induced polyploid sectors by treating dry or soaked seed clusters in 0·5% colchicine; the sectors were detected by cytological examination.
Attempts to induce polyploidy in very young inflorescences and in very young embryos are still in progress.

518. KOHLS, H. L. 633.63–1.421
**A method of correcting tonnage of sugar beets for variation in per cent stand.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 128–32a. (Mimeographed).

A table is given in which the effect of yield on stand at different environmental levels is shown, calculated from covariance analyses of experiments. Corrections for stand can be rapidly made from the table. Suggestions for its improvement are advanced.

519. SKUDERNA, A. W. 633.63–1.421
**A comparison of three methods of harvesting sugar beet plots.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 122–27. (Mimeographed).

In two variety trials differences between the varieties in respect of stand occurred, ranging from 72 to 91% in one and from 48 to 82% in the other. The yields expressed in tons per acre were calculated in three ways: (1) based on normally competitive beets only (beets surrounded by other beets in four directions, (2) based on actual yield of all beets in the rows harvested, making no correction for stand and (3) subtracting the gaps from the number of feet of row on which the yield is based.
It was concluded that the last method leads to distortion of yields and is apt to add to the unreliability of data. This tendency becomes more pronounced as the stand at harvest becomes lower.

520. BUSH, H. L. 633.63–1.421:519.24
**The three dimensional quasi-factorial experiment with three groups of sets for testing sugar beet breeding strains.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 113–16. (Mimeographed).

A brief report is given of a three dimensional quasi-factorial test of 343 ($7^3$) strains of sugar beet. Apart from the special advantages of performing cultural operations on small blocks, the precision of this experiment was between two and three times greater than that of a randomized block design.

521. SKUDERNA, A. W. and
DOXTATOR, C. W. 633.63–1.421:519.24
**Comparison of quasi-factorial and randomized block designs for testing sugar beet varieties.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 116–18. (Mimeographed).

Variety trials with 9, 16, 25 and 49 varieties designed as symmetrical incomplete block experiments were analysed as such and also as randomized block experiments. By comparing the mean square for error in each case an estimate was obtained of the relative efficiency of the incomplete block design. It is concluded that this design is likely to be less efficient than the randomized block design in trials of 16 varieties or less, about equal or better in trials of 25 varieties and much more efficient in trials of 49 varieties.

522. Brewbaker, H. E. 633.63–1.531.12:575
**Performance of direct increases of pedigreed and commercial lots of sugar beets.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 147–48. (Mimeographed).
Data are given from a trial in which, *inter alia*, comparisons could be made between original varieties and their respective mass increases. In no individual case nor on the average was a significant difference established and further tests are required before any definite conclusion can be reached.

523. Dahlberg, H. W.,
Maxon, A. C. and
Brewbaker, H. E. 633.63–2–1.521.6:575
**Breeding for resistance to leaf spot and other characters.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 169–80. (Mimeographed).
An important part of the breeding programme of the Great Western Sugar Company is breeding for resistance to leaf spot caused by *Cercospora beticola*. By bulking the seed from resistant plants, strains have been built with very high resistance and correspondingly higher yields under conditions of leaf spot infection. In the absence of leaf spot, however, they fall somewhat behind the best commercial strains. Other methods being used are varietal crosses and selection in self-fertilized lines.
Evidence has been obtained of heritable variation in winter-hardiness, resistance to *Rhizoctonia* root-rot and possibly to root-knot nematode. Possibilities also appear to exist for selecting for strength of seed stalk and for yield of seed.

524. Bockstahler, H. W. 633.63–2.484–1.521.6:575
**Resistance to Fusarium yellows in sugar beets.**
Proc. Amer. Soc. Sug. Beet Technol. 1940 : 191–98. (Mimeographed).
Fusarium yellows (*F. conglutinans* var. *betae*) attacks sugar beets at all stages, causing reductions in stand and in yield of sugar. Though rather limited in distribution at present, it is potentially dangerous.
Evidence is presented to show that substantial increases in resistance can be obtained by selection and that further improvement is possible by reselection.

525. Coons, G. H.,
Stewart, D. and
Gaskill, J. O. 633.63–2.484–1.521.6:575.125
**A new leaf-spot resistant beet variety.**
Sugar, Chicago 1941 : **36** : No. 7 : Pp. 4.
The new variety, U.S.215 x 216, is expected to be more resistant to leaf-spot and more productive than European varieties. It is also expected to be superior to the earlier introduction, U.S.200 x 215 (see "Plant Breeding Abstracts", Vol. XI, Abst. 759 and Abst. 510 above). The new variety is made by mixing the seed of two desirable inbred strains, U.S.215 and U.S.216, in equal proportions to form the planting stock from which to produce commercial seed. The commercial seed consists of a relatively high percentage of $F_1$ hybrid seed together with selfed seed of the two parents. U.S.216 has also already been released for use as a variety. Although an inbred it is equal to the high sucrose type European varieties but it is not recommended where high root yielding types are required. U.S.215 has been previously described ("Plant Breeding Abstracts", Vol. XI, Abst. 759). Tests showed that the yield of hybrids from U.S.215 x 216 was 4,642 lbs. of sugar per acre as compared with 3,881 lbs. and 4,318 lbs. from U.S.216 and U.S.215 respectively.

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526. Boiteau, P. 633.682:576.356.5
Nouvelles observations cytologiques sur le manioc cultivé. (**New cytological observations on cultivated cassava**).
Chronica Botanica 1941 : **6** : p. 388.
Varieties of cassava with $2n = 8$, 12, 16, 24 and 32 occur in Madagascar, forming a polyploid series on a basic number 4. The yield per plant increases with chromosome number, as does the size of starch grains. The test of pollen grain size is applicable to this material.

527. SCHWEIZER, J. 633.71:575(92.2)
Besoekisch Proefstation (Proefstation voor rubber, koffie en tabak). Jaarverslag tabak over Juli 1939 t/m Juni 1940. [**Besoeki Experiment Station (Experiment Station for rubber, coffee and tobacco). Annual report on tobacco from July 1939 to June 1940**].
Meded. Besoek. Proefst. 1940 : No. 66 : 1–30.

Kedoe selection was confined to planting out Kedoe 103 as a control for the new Kedoe $F_1$ and Kedoe hybrids.

The promising $F_1$ lines of Kedoe hybrids have again (cf. "Plant Breeding Abstracts", Vol. X, Abst. 814) been favourably commented on in tests in Holland and in large scale tests (1 ha. for each line) carried out by the Besoeki Station have shown an excess yield of 30% and the quality of the fermented tobacco has been judged good.

The wrapper type strain No. 382, having proved outstanding in a trial at Djember in its large leaf of fine quality and uniform coloration has now shown itself a late flowering line of excellent drought resistance in large scale tests.

Two lines of No. 385 (Kedoe 70 x L) ran No. 382 very close in quality, but the strain still shows too much variation.

Numerous mother plants were chosen among the remaining 60 wrapper lines, but selection has not yet reached the stage when planters can benefit directly.

The Djember experiment plot was again planted in 1940. Chemical examination of cigarette tobacco included material from selected plants of the indigenous pre-harvest types and Virginia varieties. Some of the indigenous cigarette types were reckoned equal to Virginia tobacco, though of course the exceptionally dry year must have been an important factor in this result.

The programme of research for the next year included: local trials of the 7 recognized Kedoe lines, large scale plantation trials of $F_1$ hybrids such as 238 x Kedoe, 343 x Kedoe, 344 x Kedoe, Canari x Kedoe, to ascertain their market value; comparison of the promising Deli lines 382, 409 and 385 (= Kedoe 70 x 1) with 343, 344, 362 and 238; small plantings of new $F_1$ types; further selection of the most promising $F_1$'s to obtain a constant line as like Kedoe as possible. Deli hybrids were also to be tested in districts where hybrids have not been grown before. Selection of Virginia and Castori tobacco was to be continued in co-operation with various business concerns.

528. SMITH, H. H. and BACON, C. W. 633.71:575:581.6
633.71:575–181
**Increased size and nicotine production in selections from intra-specific hybrids of *Nicotiana rustica*.**
J. Agric. Res. 1941 : **63** : 457–67.

The object of this work was to obtain strains of *Nicotiana rustica* which would produce a higher yield of nicotine per acre than existing varieties. The parents used in the cross were *N. rustica* var. *brasilia* strain 34753, *N. rustica* tall type and *N. rustica* Olson 68. Data were obtained for the following characters—plant height, number of leaves, size of largest leaf, weight of dried leaf material and percentage of nicotine. The best parent values were usually not exceeded until new homozygous combinations were established in the $F_2$ or later generations. Further increases in size were obtained by crossing $F_5$ selections of the new lines together. The occurrence of some exceptionally large segregants from these crosses suggests that still further increases in size of plants can be obtained. The new lines were somewhat lower in percentage of nicotine than the parental types 34753 and Olson 68, but owing to their larger size the new lines give higher yields of nicotine per acre. Suggestions are made as to the number of genes controlling the inheritance of plant height, number of leaves and size of largest leaf.

529. 633.71:575.127.2:575.129
EGHIS, S. A. 633.71:582
**On the problem of the origin of *Nicotiana rustica*.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **26** : 952–56.

The varieties of *N. rustica* are described. Mention is also made of the occurrence in Peru and

* See also Abst. 380 (Tea) and Abst. 387 (Tobacco).

neighbouring countries of a number of closely related species of the *rustica* group (these same species are placed in the *paniculata* group by Goodspeed). An amphidiploid, *N. rustica synthetica* ($2n = 48$), was obtained by colchicine treatment of the axillary buds of a hybrid between *N. paniculata* ($2n = 24$) and *N. undulata* ($2n = 24$). Morphologically this amphidiploid resembles *N. rustica* var. *scabra* very closely. Plants from self-pollination of the amphidiploid were fully fertile, though the original amphidiploid itself produced mainly empty seeds. The cross *N. rustica* female x the amphidiploid produced seeds which germinated well.

530. Brink, R. A. and Cooper, D. C. 633.71:575.127.2:581.48:581.162.5 634:581.162.5
**Incomplete seed failure as a result of somatoplastic sterility.**
Genetics 1941 : **26** : 487–505.

Seed development in the cross *Nicotiana rustica* female x *N. Tabacum* (this cross yields small shrunken seeds, only 1 to 2% of which are germinable) was studied and compared with seed development in *N. rustica* selfed and the cross *N. rustica* x *N. glutinosa* (in this cross all seeds abort at an early stage). The course of development of *N. rustica* x *N. Tabacum* seeds is very similar to that in the cross *N. rustica* x *N. glutinosa* (see "Plant Breeding Abstracts", Vol. XI, Abst. 1054) in that endosperm growth is retarded, that pronounced hyperplasia of the nucellus occurs and that the integumentary cells lying between the apex of the vascular bundle and the chalazal pocket fail to differentiate into conducting elements. The abnormalities in *N. rustica* x *N. Tabacum* are, however, less pronounced than in *N. rustica* x *N. glutinosa*. In all *N. rustica* x *N. Tabacum* seeds which continued growth beyond the early stages the endosperm was found to be in direct association with the integument through a narrow gap in the nucellus at the chalazal end. It is suggested that in *N. rustica* selfed the nutrients from the parent plant flow into both the endosperm (and from the endosperm to the embryo) and the integuments (and from the integuments to the nucellus) while in the cross *N. rustica* x *N. Tabacum* all the nutrients pass into the integuments and none directly into the endosperm. In the cross both the nucellus and the endosperm obtain their nutrients from the integuments. It is also suggested that not only does the endosperm nourish the enclosed embryo but that it has an important morphogenetic function—the establishment of conduction tissue between the vascular strand and the chalazal pocket.
In the discussion suspected cases of somatoplastic sterility in fruit trees are considered.

531. Greenleaf, W. 633.71:575.129:581.162.5:575.1
**Genic sterility in tabacum-like amphidiploids of Nicotiana.**
Amer. J. Bot. 1941 : **28** : p. 726. (Abst.).

The cytology of these female sterile *Nicotiana* amphidiploids has been previously described (see "Plant Breeding Abstracts", Vol. XI, Abst. 1053). A genetical hypothesis (suggested by P. C. Burrell) to account for this sterility is now given. It is suggested that one parent species has a slow rate of embryo-sac development and the other a fast rate. When genes for these two development rates are brought together as in the amphidiploid, there is no development of embryo sacs. Also it is not possible for either set of parental genes to be eliminated from amphidiploids. Such an elimination is, however, possible in the back-crosses of the amphidiploid to either parent and hence female fertile plants should occur in such progenies. Preliminary observations suggest that such plants do occur in these progenies.

532. 633.71:581.6:575
**New "nicotineless" burley leaf has been developed in Kentucky.**
Sth. Tob. J. 1940 : **54** : No. 9 : p. 7.

A new type of tobacco which looks, smells and tastes like burley but which contains only 0·02% nicotine (ordinary burley contains about 2·0% nicotine) has been developed at the Kentucky Agricultural Experiment Station by crossing burley with a German cigar-type tobacco containing 0·10 to 0·18% nicotine. The $F_1$ generation from this cross had a nicotine content as high as burley but it was possible to select from the $F_2$ some plants of the burley type which also had low nicotine content. By repeated back-crossing of these types to burley it was possible to obtain the new "nicotineless" burley tobacco.

533. SCHWEIZER, J. 635.71:581.6:578.08
Bijdrage tot de chemische kwaliteitsbepaling van Virginia-tabak in de tropen. (**Contribution on the chemical determination of quality of Virginia tobacco in the tropics**).
Meded. Besoek. Proefst. 1940 : No. 66 : 43–53.

A report on the application of chemical methods of quality determination in tobacco production. These methods could be advantageously used for the testing of new varieties for the first time in a particular district as well as for deciding the value of the market production. Among the aspects of the subject discussed is the relation of quality to the position of the leaf on the plant.
An aurea variety of Virginia tobacco obtained from the British American Tobacco Company has been used in hybridization and comparative trials with Joyner and a Java Virginia type. The mode of inheritance of the character high sugar content was apparently recessive. The hybrid aurea–Virginia x a Java Virginia tobacco had a still lower sugar content than the hybrid Joyner x the Java Virginia type.

534. 633.71–2–1.521.6:575(76.9)
**University of Kentucky breeds two new disease-resistant types.**
Sth. Tob. J. 1940 : **54** : No. 9 : p. 5.

Details are given of two tobacco varieties bred by the Kentucky Agricultural Experiment Station at Lexington. No. 16 tobacco is an excellent stand-up variety and is highly resistant to black root rot. At least 60% of the 1939 acreage of tobacco in Kentucky was grown with No. 16. No. 48 is a newer variety and has been developed from crosses between No. 16 and certain tobaccos resistant to mosaic by repeated back-crossing to No. 16. The new variety, No. 48, is similar to No. 16 in being a stand-up type Burley. No. 48 is highly resistant to mosaic.

535. 633.71–2.8–1.521.6:575.127.2
KAUSCHE, G. A. 633.71–2.8–1.521.6:581.165.71
Über Transplantations- und Kreuzungsversuche zur Frage der natürlichen und erworbenen Infektreaktion bei virusinfizierten Tabakpflanzen. (**On transplantation and hybridization experiments on the problem of natural and acquired infection reaction in tobacco plants inoculated with virus**).
Naturwissenschaften 1941 : **29** ; 404–05.

The author recognizes three types of reaction in *Nicotiana* to infection with tobacco mosaic virus. The first, exemplified by Samsun tobacco, is the totally susceptible, the second, found in *N. Langsdorffii* and *N. glutinosa*, the locally susceptible and the third, shown by *N. glauca*, the non-reacting.
If *N. glutinosa* is grafted on Samsun, then tobacco mosaic infection from the Samsun stock produces in *N. glutinosa* both local and general symptoms, though cuttings raised from side shoots of the scion show only local symptoms. In the reciprocal graft, the virus in *N. glutinosa* remains localized and the scion is not infected.
In the cross Samsun ♀ x *N. glutinosa* ♂ an $F_1$ is obtained which resembles Samsun morphologically but, it is stated, reacts to tobacco mosaic only locally. In the reciprocal cross a Samsun type is obtained which reacts like Samsun.

536. KASPARYAN, A. S. 633.72:576.356.5
**Tetraploidy in tea (*Thea sinensis* L.).**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 1017–19.

Two tetraploid ($n = 30$) tea plants were found in the experimental fields of the branch station of the Tea Institute at Chakva. Descriptions of the plants are given. Both are seed sterile but this may be due to their being surrounded by diploid plants (tea is a cross-pollinated plant).

537. *Mendes, J. E. T.,
Brieger, F. G.,
Krug, C. A. and
Carvalho, A. 633.73:575(81)
633.73–1.557:519.24
Melhoramento de *Coffea arabica* L. var. Bourbon. **(Improvement of *C. arabica* L. var. Bourbon).**
Bragantia, São Paulo 1941 : **1** : 1–76; also Rev. Inst. Café S. Paulo 1941 : **28** : 1167–76.

Since the Brazilian plantations contain several plants per hole a special planting has been made containing single plants per hole, consisting of progenies of the best and most representative plants of all three of the main varieties, Bourbon, typica and Maragogipe. Yield data were collected on 1,095 Bourbon trees in the years 1933 to 1939. Individual plant records were made also in respect of height and diameter. Very pronounced differences were observed from tree to tree. Thus by 1939 there were some trees producing 21·0 kg. of beans, while others produced less than 0·5 kg. The best tree was No. 426, with 71·803 kg. for the 7 years, followed by No. 1,056 with 65·890 kg.

In chapter 2 full statistical data are presented for the yield observations over the period. These show that the plants are of 3 main types, (1) those with high yields in even years and low in odd years, (2) those with the converse cycle, in some pronounced and in others less pronounced; (3) plants whose yield increased progressively from 1933 to 1938; there were 2 sub-types, (3a) in which 1939 showed a sharp fall and (3b) in which there was only a slight fall or even a further increase in 1939. Certain others were irregular and impossible to classify. There would appear to be a genetical difference between types 1 and 2 with biennial cycles and type 3 with progressively increasing yields. In later years however many of these trees also develop a biennial cycle. By the decomposition of the variation into the above types it was possible to arrive at standard error values which no longer vary in consequence of the heterogeneity of the distribution. It would appear that the plants belonging to the same type as regards annual cycle are reasonably homogeneous among themselves.

A significant correlation was found between the yields in the different years, so that a tree that is superior in one year tends to be good also in other years.

It was on the basis of the statistical results and on the classification into cyclic type that selections of the most promising trees were made. Since type 3b is the most desirable, in view of its regularity of yield, a number of trees of this type with even slightly low average yield have been selected.

Before the statistical results were available preliminary selections were made in the field, based on yield, size of fruits, uniformity of ripening, growth habit, amount of secondary branching and of foliage, etc., etc. The yield was always determined in the first year and, where possible, also in the following year or two. Determinations were also made of the size of seed and of the ratio of seed weight to fruit weight; also of the percentage of "moca", "shell" and "flat" beans. Progenies of the selected plants are under observation. Records were made of beginning and end of germination, the number of plants with abnormal numbers of cotyledons and primary leaves, the length and breadth of the former and the latter and the coefficients of variation; and the number of plants of the types *angustifolia*, variegated, virescent, *bullata* and with 3 primary leaves per whorl. Considerable variation is noted in the total annual yield of each progeny. Differences in amount of dieback were noted both between progenies and between individual plants within progenies.

Many of the trees selected on these preliminary observations coincided with those later singled out by the statistician as superior trees. No correlation has been observed between yield of mother plant and of progeny. Different plants and also progenies react very differently after high yields, some dying back sometimes completely, others retaining their leaves and showing very little variation from year to year.

Second inbred generations showed very little reduction in variability and it seemed that the second self-pollination had not adversely affected either the development of the trees or their yield. Some of the new progenies are remarkably uniform.

* An abridged translation of this paper is on file at the Bureau.

538. KRUG, C. A. and
MENDES, A. J. T. 633.73:575.127.2:576.354.4
Observações citológicas em *Coffea*. IV. (**Cytological observations in *Coffea*. IV**).
Bragantia, São Paulo 1941 : **1** : 467–82.
This is the Portuguese version of the article reviewed in "Plant Breeding Abstracts", Vol. X, Abst. 301.

539. CARVALHO, A. 633.73:575.247–181.13
Genética de *Coffea*. IV. Instabilidade do par de alelos *Na-na* de *Coffea arabica* L. (**Genetics of *Coffea*. IV. Instability of the pair of alleles *Na-na* of *C. arabica* L.**).
Bragantia, São Paulo 1941 : **1** : 453–66.
Further to the investigations of Krug (see "Plant Breeding Abstracts", Vol. IX, Abst. 614) the author reports 3 more mutations of the dwarf gene in *C. arabica*. Some 200 *nana* plants obtained by selfing plants of the *murta* types were under observation. One of these plants bore certain branches more closely resembling the *murta* type which grew at a much greater rate than the *nana* section. In its final state of development the plant bore leaves resembling Bourbon but somewhat smaller, thicker and more undulating. One of the other plants bore one branch of the *murta* type, the rest remaining typical *nana*.
A further progeny from selfing a *murta* plant contained 23 Bourbon, 51 *murta* and 28 *nana* types. One of these *nana* trees bore a lateral branch entirely of the Bourbon (*Na Na*) type and another of the *murta* (*Na na*) type. Later other mutations were observed such as 2 Bourbon or *murta* leaves at a node amongst typical *nana* leaves, a pair consisting of 1 *nana* leaf and 1 Bourbon or *nana* and even leaves of mixed type.
From these observations it is concluded that the gene in question mutates more frequently from the recessive to the dominant than in the opposite direction. The mutation *Na na* to *na na* seems to be one of the rarest of all.

540 BACCHI, O. 633.73:576.356.52:576.356
Observações citológicas em *Coffea*. VII. A macrosporogênese na variedade "*Monosperma*." (**Cytological observations in *Coffea*. VII. Macrosporogenesis in the variety *Monosperma***).
Bragantia, São Paulo 1941 : **1** : 483–90.
A study of the haploid ($2n = 22$) variety *C. arabica* L. var. *monosperma* showed that all the ovules were normal until the first division, when considerable irregularities were observed, followed by rapid degeneration in megasporogenesis of the ovules. The divisions forming the embryo sac were also irregular and in 87 ovules examined only 1 normal embryo sac was found. No fertilization occurred and the ovules finally degenerated. The various irregularities are illustrated.

541. CHAVARRIAGA MISAS, E. 633.74:575.12
Cuál variedad de cacao debemos sembrar ? (**Which variety of cacao should we sow ?**)
Rev. Fac. Nac. Agron. Colombia 1941 : **4** : 1325–29.
Reference is made to a cacao variety of the name Injerto [Graft], which originated from seed of a Calabacillo plant growing in a plantation of Criollo in the valley of Cauca, in Colombia. The progeny showed greater resemblance to Criollo than to the seed parent. The vigorous growth of the hybrid, incorrectly named a graft, is ascribed to heterosis and leads the author to suggest that such hybrid seed obtained by crossing Criollo and Forastero types should be used for planting.

542. 633.74:581.6:575
KADEN, O. F. 633.74:581.48:575.061.6
Untersuchungen des Gerbstoffgehaltes der Kakaobohnen. Versuch einer chemischen Zuchtwahl der Kakaobäume. (**Investigations of the tannin content of cacao beans. Breeding cacao by chemical selection**).
Tropenpflanzer 1939 : **42** : 409–18.
It is suggested that as selection on botanical grounds has not made great progress, an

investigation should be undertaken with the chemical composition, especially the amount of tannin, as a basis for selection.

The beans of the hard-shelled and short-oval form, the "Calabacillo", type are, on account of their harsh flavour, the least valuable economically and contain about 10% of tannin. The yellow, white-fleshed and slender fruit of the "Criollo autentico" [true Criollo], on the other hand, contains only about half as much tannin. Between these two extremes are a number of intermediate types with about 7·5% of tannin and fruit of the shape best described as long-oval, the "Amelonado" type.

Six per cent has been fixed as the dividing line between the beans with little and those with much tannin, and this distinguishes the beans producing "Edel" cocoa from those producing "Konsum" cocoa. Beans of the former group with white or only slightly coloured cotyledons take only 2–3 days to ferment, while the latter with definite violet ("Kress") coloration need 5–8 days fermentation.

On crossing, the characteristic features of the beans from the two groups of tree types for some reason remain associated in their hybrids. The tannin content of the beans of the hybrids is less throughout than in the pure "Konsum" cacao of a similar fruit form. This is attributed to the occurrence of white and coloured beans in a single fruit. Though this "bean mosaic" phenomenon is known to occur in the fruits of pure Criollo cacao growing in the vicinity of Forastero trees, the reverse has so far not been observed.

The production of cacao "Kress" in the beans, which is equivalent to the storage of large amounts of tannin, is thus a dominant character. This explains the tendency of the output of Criollo beans to decrease from year to year. The tendency to produce tannin in the bean has also a biological function and is associated with disease resistance.

The best type of fine quality cacao with least tannin is found in Central America where climate and soil are most suitable for its cultivation. These trees are not a special species or variety but represent selected local modifications of the species *Theobroma Cacao* L.

The hybrids between Criollo and Forastero types are in many cases, in spite of their relatively low tannin content, very resistant to disease. This is especially true of the red-fruited hybrids. The so-called "Cacao porcelaine" of Java is probably an instance. The characters of the local Brazilian types of *Th. Cacao* L. are briefly described. It is to be noticed that in the various types the sugar content of the fruit juice is inversely proportional to the amount of tannin in the fruit.

In conclusion, the importance of hybrids and the possibilities of improvement by crossing are stressed. Finally, the two economically valueless species *Th. bicolor* and *Th. grandiflorum* are described. R. M. I.

543. Tschepourkovsky, E. 633.75:575–184

**An experimental biometrical study on the inheritance of the number of rays in *Papaver somniferum.***

Proc. 6th Pacific Sci. Congr. 1940 : **4** : 737–38.

The number of rays in the capsules of daughter plants was not correlated with the number of rays in the mother plants. The number of rays appears to be influenced by the conditions of growth of a plant and not to be inherited. It is therefore of no use for distinguishing sub-varieties of *P. somniferum.*

544. Yasui, K. 633.75:575.127.2:576.356

**Cytogenetic studies in artificially raised interspecific hybrids of *Papaver.* VIII. $F_1$ plants of *P. bracteata* x *P. lateritium.***

Cytologia, Tokyo 1941 : **11** : 452–64.

The cross was only successful when *P. bracteata* was used as the female plant. Many external characters of *P. lateritium* were dominant in the $F_1$ but some were intermediate. Both plants have 14 somatic chromosomes and 14 is the somatic number of the $F_1$.

Three to five bivalents were observed during meiosis. Several irregularities were noted in the first meiotic division and as a result, though the second division was fairly regular, very few fertile pollen grains were formed. R. M. I.

545. Volotov, E. N. 633.75:576.356.5:581.04
**Polyploids in *Papaver somniferum* L. induced by treatment with colchicine.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 261–63.
Tetraploid ($2n = 44$) and diploid-tetraploid chimaeras were obtained in *Papaver somniferum* by two methods of colchicine treatment (seed soaking and treating the growing point of seedlings with a cotton sponge containing colchicine solution). The tetraploid seeds are larger than diploid seeds. No triploid seeds have been obtained from crosses between diploids and tetraploids. The tetraploids are much less fertile than the diploids and have thicker stems and leaves and a vegetative period 6–8 days longer than the diploids.

546. 633.75:582(49.7)
Nikolloff, J. 633.75:581.48:575.061.6
**(On the botanical composition of the poppy in the new regions [of Bulgaria]).**
Rev. Inst. Rech. Agron. Bulg. 1939 : **9** : No. **1** : 63–73.
The diversity of the forms and classification of the poppy are discussed in the light of the results obtained by previous investigators. The necessity of taking economic features into account when drawing up a classification of the numerous forms of *Papaver somniferum* grown in Bulgaria is emphasized. A classification of this kind must also include particulars of chemical determinations that can be used as a basis for estimating the merits of the varieties available for breeding purposes.
The present study (unavoidably incomplete) deals with the forms of *P. somniferum* found in the Petričko, Sv. Vračko and Džumaisko districts of Bulgaria. These forms differ *inter alia* in seed colour, in the latitudes and longitudes where they are found and in the quality and proportion of them present in the seed available for planting.
The seeds of *P. somniferum* are characterized by their red coloration and their form and structure. The colour varies between wide limits but the last two features are constant for the species. The literature on the subject is reviewed from Bulgarian and other foreign and English sources.
Seed colour is hereditary, grey being dominant to white.
Bulgarian forms display great variety including types with white, light blue, violet, grey, pale pink, red, yellow and dark blue seeds, and in the poppy fields in the Petričko, Sv. Vračko and Upper Džumaisko regions a medley of colours is found owing to the use of unselected seed. Each of these three regions is characterized in the main by the predominance of certain forms with their distinctive colour of seed; but in general the white seeded types predominate after which come those with light blue and those with dark blue seeds. The incidence of the types with their different seed colours was also studied with regard to altitude above sea-level.
The need for further work on other characteristics of *P. somniferum* to supplement this botanical study is stressed.

547. Ono, T. 633.79:577.8:576.356.5
**(Sex behaviour of triploid intersexes in *Humulus japonicus*).**
Bot. Mag. Tokyo 1941 : **55** : 94–102.
Using colchicine-induced polyploids, 36 plants of the second generation have been obtained, 14 diploids and 22 triploids. The diploids are normal, consisting of 9 females with the constitution XX + 14 autosomes and 5 males with XYY + 14 autosomes. The triploids consist of 10 females (XXX + 21 autosomes) and 12 intersexes (XXYY + 21 autosomes).
The intersexes are monoecious with female clusters on the lower branches. They can be classified into male, intermediate and female types. They start as female and later revert towards maleness. They are male sterile but, with the exception of the male types, more or less fertile on the female side.

## CONDIMENTS 633.84

548. Schermerhorn, L. G. 633.842–2.8–1.521.6
**Rutgers World Beater No. 13 pepper.**
N.J. Hort. Soc. News 1941 : **22** : p. 1348.
The Rutgers World Beater No. 13 pepper is a mosaic resistant strain selected by the New Jersey Agricultural Experiment Station from the old variety World Beater.

549. Dugand, A. 633.845:582
El genero *Capparis* en Colombia. (**The genus *Capparis* in Colombia**).
Caldasia **1941** : **2** : 29–54.
A systematic account of 19 species and one form of *Capparis* occurring in Colombia with a key for their differentiation and vernacular names and synonyms. The species are described as new.

## OIL PLANTS 633.85*

550. Sidorov, B. N. and
Sokolov, N. N. 633.853.55:576.356.5:581.04
**Production of tetraploids in *Ricinus communis* treated with colchicine.**
C.R. (Doklady) Acad. Sci. U.R.S.S. **1941** : **31** : 264–65.
Tetraploid ($2n = 40$) *Ricinus communis* plants were obtained by colchicine treatment. The tetraploids differ from the diploids in having thicker and darker green leaves, in having larger cells (stomata and pollen grains) and in having larger seeds (1·5 times the weight of diploid seeds). No triploid seeds were obtained from attempted crosses between diploids and tetraploids.

551. Kugler, W. F. and
Remussi, C. 633.854.54:582(82)
Descripción de variedades agricolas de lino por sus caracteres morfológicos. (**Description of agricultural varieties of flax by their morphological characters**).
"Granos" Semilla Selecta, B. Aires **1939** : **3** : 131–49.
Eight commercial linseed varieties and a new selection 6906 M.A. are described, with indications of their origin, illustrations and a diagnostic key. The characters used in the classification were colour of hypocotyl, leaf characters, height of plant, characters of the flower, fruit and seed, earliness and resistance to *Fusarium*, *Melampsora* and *Septoria*.

552. Brown, R. T. and
Fisher, E. 633.854.56:581.162.3
**Period of stigma receptivity in flowers of the tung tree.**
Proc. Amer. Soc. Hort. Sci. **1941** : **39** : 164–66.
Pistillate flowers of tung trees were found to be receptive from the time of corolla opening to nine days after its opening.

553. Fernholz, D. L. and
Potter, G. F. 633.854.56–2.111–1.521.6
**Preliminary experiments on the resistance of the tung tree to low temperature.**
Proc. Amer. Soc. Hort. Sci. **1941** : **39** : 167–72.
The tissues of tung trees were found to increase steadily in cold resistance from the time of leaf fall to mid-winter and then to decrease in resistance in the spring. The tissues were most resistant during February. Inherent differences in the cold resistance of seedling tung trees were established. The effect of fertilizers on cold resistance was also investigated.

554. Liashchenko, I. F. 633.854.78:575.1:575.127.2
**Some results obtained by crossing cultivated and wild sunflower.**
C.R. (Doklady) Acad. Sci. U.R.S.S. **1941** : **30** : 242–44.
Crosses between the wild broom-rape resistant sunflowers, *Helianthus annuus* and *H. debilis*, and susceptible cultivated varieties of *H. annuus* were studied. The wild forms also show drought resistance and slow rate of growth. In the $F_1$ generations of crosses between wild and cultivated *H. annuus* forms, resistance is dominant to susceptibility but the other wild physiological characters are recessive. The wild morphological characters are dominant to the cultivated ones. In most crosses there was no segregation in the $F_2$, all plants being of the wild type. In two crosses the complex of wild form characters was dominant in the $F_1$ but all the $F_2$ plants were of the cultivated type. In crosses between *H. debilis* and cultivated forms of *H. annuus* only cultivated types were obtained in both the $F_1$ and $F_2$ generations.

* See also Absts 377 and 378.

555. Anan'eva, S. V. 633.854.78:575.257
**(The mentor method applied to the sunflower).**
Socialistic Grain Farming, Saratov 1941 : No. 2 : 118–33.

Alterations in grafted sunflowers were observed in respect of time of maturity. Thus the mid-early variety 169, grafted on to Saratov Early, was 3 days earlier than controls of 169 grafted on to itself; when grafted on to the late variety Fuksinka 10 it was 11 days later and on perennial sunflower 22 days later. Similar results were observed in other varieties. The vigour of the graft varied according to the vigour of the stock chosen, but particularly vigorous grafts were obtained on Hybrid No. 2, which shows heterosis but is not more vigorous in growth than some commercial varieties. Thus Saratov Early grafted on to this hybrid yielded four times as much as ungrafted plants.

When variety 169 was grafted on to the perennial species *H. mollis* changes occurred also in a number of morphological characters and in the form of the seeds.

The first generation progeny from the various grafted plants were mostly more vigorous than the controls and some were earlier than either of the parental forms. The diameter of the inflorescence, yield of seed and seed weight were also greater in the progeny of grafted plants; there was a certain amount of variation in all these characters within each progeny. In husk percentage the progenies were intermediate and in oil content they were usually below the parent forms; this is ascribed to the removal of the leaves from the grafted plants. Some progenies of grafts on high oil containing forms showed an increased oil content.

When the dwarf sunflower (Karlik) or other inferior form was used as stock the reverse effects were observed.

Sunflowers grafted on to Jerusalem artichoke had smaller leaves and inflorescences, were 36 days later in maturity and gave no seeds. The tubers on the rootstock were reduced in size but otherwise typical. The plants arising from them were again grafted with sunflower; this time the resulting tubers showed a number of alterations in form and colour and several of them bore roots on their surface. The resulting plants segregated much in the same way as generative hybrids.

556. Constancio Lázaro, R. 633.854.78:576.312
Observaciones citogenéticas sobre girasol (*Helianthus anpuus*). [**Cytogenetic observations on sunflower (*H. annuus*)**].
Rev. Fac. Agron. Univ. Montevideo 1941 : No. 23 : 59–67.

Meiosis and mitosis are briefly described, the chromosome number $n = 17$ being confirmed. The methods employed are described in detail.

557. Liashchenko, I. Th. 633.854.78–2.5–1.521.6:575.182
**Cases of no segregation in sunflower hybrids.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 821–22.

In studying the resistance of sunflower strains to *Orobanche*, crosses between resistant or immune and susceptible strains were made. In six crosses no segregation for resistance or for morphological characters occurred, in spite of the evident hybridity of the $F_1$. In 4 cases the seed parent was highly inbred. It is suggested that this is due most probably to a type of cytoplasmic inheritance which is more strongly expressed in the $F_2$ than in the $F_1$ (cf. Abst. 558).

558. Liashchenko, I. Th. 633.854.78–2.5–1.521.6:575.182
**Cytoplasmic heredity in sunflower.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 823–24.

In four pairs of reciprocal crosses between strains of sunflower differing in resistance to *Orobanche cumana* there was noted a tendency of the $F_1$ to resemble the seed parent in respect of percentage of affected plants and in the degree to which they were affected.

In two of these pairs $F_2$ generations were raised by self-pollination, cross-pollination and open-pollination of the $F_1$, and comparison in each case of an $F_2$ with the corresponding reciprocal showed that, although segregation did occur, there was a strong tendency to resemble the female parent.

559. ZAKHAROV, B. S. 633.854.78–2.5–1.521.6:581.035.1
Der Einfluss der Tageslänge auf den Befall der Sonnenblume durch die *Orobanche cumana*. (**The influence of day-length on the attack of *O. cumana* on sunflower**).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 267–70.

From the experiments here reported it is concluded that since short days favour the attack of sunflower by *Orobanche cumana*, selection for resistance should be carried out under short day conditions.

## RUBBER PLANTS 633.91*

560. OSTENDORF, F. W. 633.912:575:581.165.1(92)
Rubber-plantmateriaal, 1936–1941. (**Rubber planting material, 1936–1941**).
Bergcultures 1941 : **15** : 852–59.

Continuing his 1936 survey (cf. "Plant Breeding Abstracts", Vol. VII, Abst. 612) of the trend of policy as regards advisory information for planters, the author points out that during 1936–41 an attempt has been made to take into consideration local differences in the performance of the various clones on different estates.

From the advisory recommendations from 1936–41, the following clones are seen to have been retained as suitable in most districts: Tjir 1, Tjir 16, War 4, PR 107, LCB 1320, Pilm.B 84, GT 1, AV 255, AV 352 and KD 1. Tjir Nos. 1 and 16 head the list as regards yield, though the first named is very susceptible to wind damage, and has a delicate bark and is subject to a great reduction in yield in the dry season.

For the present it would appear to be difficult to find more productive clones than those now in use and the breeder is concentrating on combining by hybridization and selection the yield level already attained with good subsidiary characters, e.g. thick bast, rapid growth, and resistance to diseases of the tapping surface and to damage by wind. AV 352, a clone thus obtained, has equalled Tjir 1 in yield and surpassed it in bast quality. Second generation clones (including PR 207) have also given yields equal to Tjir 1, but all are descendants of Tjir 1 and may therefore have inherited its defects too. Data on other good clones from the oldest series of crosses dating from 1927 and subsequent years should also soon be available. In the hybridization work (reviewed in 1935 and 1937 by Vollema and Dijkman) and in the comparisons of the performance of seedlings and buddings made from them, a method has been devised that eliminates the interval between the planting of the seedlings and the choice of the mother trees for the clones.

The influence of the stock on yield has also been under investigation by various workers. Apparently illegitimate seedlings (e.g. AV 163) are particularly suitable as stocks, though compatibility of scion and stock must also be considered. Comparative trials of stocks are in progress. Schmöle's work with *H. Spruceana* stocks is also of interest (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 416) and small scale trials can be recommended.

Another line adopted in the improvement of clonal material is concerned with the relation between the performance of (1) clones raised from buddings from the main stems of seedlings and (2) of the mother tree. A remarkably close resemblance in both habit and yield has been found to exist between these two groups, whereas buddings obtained in the ordinary way (i.e. from branches of an old mother tree) differ more from the mother tree in their performance and habit. Further confirmatory evidence on this problem is adduced from an analysis by Tollenaar (not yet published) of the results obtained by Ferwerda (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 192).

If it is found that the tendency to form a conical trunk is retained in "main stem buddings" when they are multiplied in a plantation, then a method will have been discovered for obtaining clones that will not be very far behind their mother trees in performance, and this feature can be included for study in the breeding programme.

Seedlings recommended in 1940 for planting on a small scale comprise Tjir 1 (selfed), Tjir 1 x 16, AV 157 x AV 166 and AV 166 x Av 161 as well as crosses of BR 2 with PR 105, Lo 6, 107 and AV 50 and the family Av 163 (illegitimate). The occasional superiority of the yield of some of these clones as compared with Tjir 1 is attributed to wind damage affecting the latter. The

* See also Abst. 380.

suggestion that with proper selective thinning the yields from the new clones might equal those of the best clones is considered.
Some comments on the practical value of seedlings as compared with clones conclude the report.

561. SCHWEIZER, J. 633.912:575:581.165.1(92)
*Hevea*-plantmateriaal in Besoeki. (***Hevea* planting material in Besoeki**).
Bergcultures **1941** : **15** : 598–609.
The discrepancies between the official recommendations of *Hevea* in different regions are discussed and explained by reference to the variation in the reactions of clones to environmental factors including cultural measures. The need for a complete testing of planting material and full allowance for the influence of secondary characteristics in determining yield is stressed.
The relative merits of buddings and seedlings are discussed against the historical background of the problem which has occupied planters and breeders for so long. The transmission of desirable and undesirable characters in clones and seedlings is also discussed.
The author concludes that existing tested and recommended legitimate and illegitimate seedlings, provided they are subsequently thinned out on the basis of the results of stringent trials, are as good as, and in some circumstances better than, the recommended clones. (Cf. "Plant Breeding Abstracts", Vol. XI, Abst. 62.)

562. SCHWEIZER, J. 633.912:581.13:581.165.1:575
Bijdrage tot de physiologie van den z.g. "Hoogtap". (**Contribution to the physiology of the so-called "high-tapping"**).
Bergcultures **1941** : **15** : 1214–28.
Clonal differences in the rubber concentration in the crown and in the response to heavy tapping are mentioned, as well as individual differences in the composition of the latex from high and low incisions. Production from high tapping also varies owing to certain causes which, it is tentatively suggested, might be genetic.
Some high yielding trees are found that under normal conditions give an equally high yield from a high and from a low incision on the bark. This "topo-physical" characteristic of the bark—the production of a large amount of latex high up in the tree—should persist in a clone (a clone being after all morphologically a branch). These observations may therefore provide a new basis for mother tree selection and the application of the method is recommended for re-testing existing mother trees and those from legitimate crosses, etc., that have still to be tested. The increased severity of the standards of selection should greatly increase the chance of discovering superior clones.

563. 633.912:581.143.7:581.165.1
633.00.15(92)
Ressort Lampongsche Districten van het Suid- en West-Sumatra Syndicaat. (**The Lampong districts area of the South and West Sumatra Syndicate**).
Bergcultures **1941** : **15** : 1200–05.
An account of the organization and research work of the West Java Experiment Station was given by Dr C. Coster. Selection work on rubber is being furthered by the exchange of plant material with the Avros Company, Malaya and Ceylon for local testing. In Java legitimate seedlings are also undergoing local tests.
Tjirandji I is still one of the highest yielding clones.
Gradually, however, modern seedlings are coming to be regarded as possibly just as good as clones themselves. They are often thought to be more "natural" and vigorous than a budding; but this is highly improbable as regards the high yielding modern seedlings which are just as susceptible to various diseases as the good clones. Moreover the reaction of the most recent seedling families to the different environments has not yet been adequately investigated. Hence the West Java Station has been cautious in recommending seedlings.
Another unsolved problem is that of stock; but good clonal seedlings (or according to Avros *Spruceana* hybrids) can safely be recommended.

564. Ostendorf, F. W. 633.912:581.165.1:575.12(92)
Resultaten van toetstuin 1934 (proeftuin Tjiomas) tot en met het tweede tapjaar. [**Results from the test plantation Tjiomas (experimental plantation) up to and including the second tapping year**].
Bergcultures 1941 : **15** : 960–64.

A progress report on the importance of clones from various seedlings including some from crosses between families from the Tjirandji clones and some obtained from AV clones by artificial hybridization. (See Horticultural Abstracts.)

565. 633.912:581.165.711:575.12
Schmöle, J. F. 633.912:581.6(92)
*Hevea brasiliensis* en *Hevea Spruceana*-hybride als onderstam voor oculaties. II. (***Hevea brasiliensis* and *Hevea Spruceana*-hybrids as stock for budgrafts. II**).
Arch. Rubbercult. Ned.-Ind. 1941 : **25** : 149–65.

Bie, G. J. van der
Een vergelijkend onderzoek van de eigenschappen van de rubber, verkregen van oculaties op onderstam van *Hevea Spruceana* hybride en van *Hevea brasiliensis*. (**A comparison of the properties of rubber, obtained from buddings on stock of *Hevea Spruceana* hybrids and of *Hevea brasiliensis***).
Ibid. 1941 : **25** : 271–93.

A progress report on the investigation being conducted in the Polonia plantation (cf. "Plant Breeding Abstracts", Volume IX, Abst. 416). The first article appears in both English and Dutch versions.
Clones AV 49, 50 and 256 on stocks of the *Hevea Spruceana* hybrid did much better than on *Hevea brasiliensis*. The improvement was evident in the better crown and stem development, in the greater thickness of the untapped and the renewed barks and in the greater number of latex vessels. Their yield too was superior and the difference in yield between the material grafted on the hybrid and on *H. brasiliensis* increases with the age of the plantation, but decreases as the tapping cut approaches the site of union of the budding.
Crêpe rubbers made from latex from the grafts on the hybrid are yellower than from those on *H. brasiliensis*. Further particulars of the physical and chemical properties of rubber from the buddings on the hybrid stock are given in the second article cited in this abstract.

566. 633.912–1.531.16:578.08
633.912:575.12(92)
Eikema, J. S. 581.481
Kiem- en bewaarproeven van *hevea* zaden. (**Germination and storage tests of *Hevea* seeds**).
Bergcultures 1941 : **15** : 1049–60.

A detailed account of experiments on the many and various conditions affecting germination and storage of rubber seed carried out at the new *Hevea* breeding centre of Messrs. H. G. Th. Crone at Polokarto, where work on artificial crosses is being conducted on a considerable scale. The merits of twin seedlings as a measure of economy in the use of valuable pedigree seed is also discussed. (See also "Horticultural Abstracts").

567. 633.912–1.557:581.143.7:578.08
Dijkman, M. J. 633.912:575.12(92)
Selectieve uitdunning in jonge rubber-zaailingen-aanplanten. (**Selective thinning in young rubber seedling plantations**).
Bergcultures 1941 : **15** : 11–15.

The author records observations from West Java experiments on seedling families obtained by artificial pollinations of a number of PR, Klapa Noenggal, Tjibeureum and Menteng clones and some illegitimate (probably *Hevea brasiliensis*) crosses with foreign *Hevea* species. He concludes that selective thinning can be successfully practised at an early stage to ascertain the genetic yield capacity in seedling plantations, provided certain conditions are observed. The value of the Hamaker tapping system in such determinations is discussed.

568. Schmöle, J. F. 633.912–1.557:581.143.7:578.08
Zeer dicht planten en intensief uitdunnen van zaailingen-aanplanten. (**Very dense planting and intensive thinning of seedling plantations**).
Bergcultures **1941** : **15** : 620–21.

Seedlings show much greater variation in the yield per tree than buddings. The method of selection based on a special system of thinning, combined with tapping tests here described, will, it is claimed, ensure an increase of 20–25% in the yield from a seedling plantation.

569. 633.912–1.557:581.165.711
Tollenaar, D. 633.912:575.12
De belangrijkheid van het onderstamvraagstuk voor de rubbercultuur. (**The importance of the question of the stock for rubber cultivation**).
Bergcultures **1941** : **15** : 1014–19.

Ferwerda's data and findings on the relation between the yields of mother seedlings and of their buddings (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 192) are restated with some amplification and possible causes for the lower output from the buddings are examined. The writer concludes that the use of superior stocks is a vital factor in determining the yield from buddings. Further evidence from various sources (already reviewed in "Plant Breeding Abstracts") is analysed in support of this point and it is suggested that in all future records of performance of clones the identity of the stocks used should be stated. Special reference is made to the possibilities of *Hevea Spruceana* hybrids as valuable stocks.

570. Navashin, M. S. and
Gerassimova, H. 633.913:576.356.5:581.04:575
**Production of tetraploid rubber-yielding plant, *Taraxacum kok-saghyz* Rodin, and its practical bearing.**
C.R. (Doklady) Acad. Sci. U.R.S.S. **1941** : **31** : 43–46.

More than a hundred tetraploid kok-saghyz plants have been produced by colchicine treatment of their roots (see "Plant Breeding Abstracts", Vol. X, Abst. 700 for the method used). The tetraploids are much larger than the diploids. Tetraploid achenes are twice as heavy as diploid but no figures have yet been obtained for root size. The tetraploids have latex vessels of larger diameter than those found in diploids. Tetraploid seedlings can be recognized by their broader leaves. The chromosome numbers of 230 seedlings obtained from seed produced by the tetraploids were determined—200 proved to be tetraploid ($2n = 32$), 16 had $2n = 31$, 11 had $2n = 33$, 2 had $2n = 30$ and one had $2n = 34$. The number of filled achenes per head varied between 20 and 90 for tetraploids (diploids produced about 80 achenes per head). In a further lot of plants raised from tetraploid seed, 637 were regular tetraploids and 101 had aberrant chromosome numbers. It is hoped to have an improved tetraploid population of from 2 to 3 million plants in the autumn of 1941.

571. Kupzow, A. J. 633.913:581.143.26:575(47)
Über die relative Grösse der Wurzel bei im ersten Lebensjahre blühenden Exemplaren von Kok-saghyz. (**On the relative size of the root in kok-saghyz specimens flowering in their first year**).
C.R. (Doklady) Acad. Sci. U.R.S.S. **1941** : **30** : 649–51.

In kok-saghyz breeding, selected roots are planted to produce seeds in their second year and there is no harvest of seeds from plants flowering in their first year. First year flowering in kok-saghyz depends upon both the environment and the genotypes of the plants. A higher percentage of plants flower in the first year under conditions of high fertility (plants also have thicker roots under such conditions). Even under conditions of high fertility and good spacing, however, there are some plants which do not flower in their first year. Such plants have a longer development cycle than those which flower in their first year. The biennial types have more leaves per rosette and thicker roots than the annual types; they also have the upper leaves of their rosettes of the feathery type. Other plants have entire upper leaves (the first leaves of all kok-saghyz plants are entire) and others have ragged upper leaves. In some cases (e.g. in a dense bed) the plants which do not flower in their first year consist of both biennial types and badly developed annuals. In such cases the plants which flower in the first year may have thicker roots than those which do not. Under good conditions, however, plants which do not flower in their first year have thicker roots than plants which flower in their first year.

572. Jakovlev, P. N. 634:575.127(47)
**(Development of I. V. Michurin's doctrine by the research institutes).**
Sady i Ogorody (Fruit and Vegetable Gardens) 1941 : No. 6 : 2–8.

Many of the seedlings produced by Michurin have not yet begun to bear, or have only just done so. These seedlings are being subjected to special treatment with manures, mentors, etc., on the lines recommended by Michurin for influencing development. Many of the seedlings just beginning to crop combine high quality and frost resistance. The best are being selected; they include a pear (No. 15) with exceedingly low acid and tannin content and high sugar. Data are given showing the success of the original Michurin varieties in the many areas of the U.S.S.R. where they have been introduced. Further crosses are also being carried out between hardy northern fruits and high quality varieties from southern and western Europe, and the achievements of Michurin's disciples include the production of a sweet cherry maturing at the same time as the strawberry, a frost resistant peach from crosses between the plum Okia and the Amsden peach and many other complex *Prunus* hybrids. Sterile hybrids between European and American gooseberry species have been made fertile by growing under particularly favourable conditions in well manured soil. Hybrids have been obtained of the golden currant with gooseberry and with blackcurrant, of red currant with blackcurrant, and of *Fragaria grandiflora* with *F. elatior*. Frost resistant almonds and *Actinidia* hybrids with very high content of vitamin C are among the other hybrids mentioned.
In all this work great attention is given to the upbringing of the seedlings.

573. Kovalev, N. V. 634–1.524(47)
**(Wild fruit plants of the Caucasus and their role in the people's economy).**
Priroda (Nature) 1941 : No. 5 : 44–55.

Present figures show that the Caucasus area contains 25 genera and 129 species of fruit trees, as follows:—*Pyrus* 17 species, *Cydonia* 1, *Crataegus* 13, *Malus* 2, *Amelanchier* 1, *Sorbus* 21, *Mespilus* 1, *Cornus* 1, *Prunus* 3, *Cerasus* 7, *Amygdalus* 5, *Laurocerasus* 1, *Padus* 1, *Juglans* 1, *Castanea* 1, *Corylus* 3, *Zizyphus* 1, *Diospyros* 1, *Ficus* 1, *Punica* 1, *Berberis* 4, *Rubus* 34, *Ribes* 4, *Grossularia* 1 and *Vaccinium* 3.
This is a greater range than is found in any other part of the Soviet Union. Vivid descriptions are given of the unparalleled wealth of fruits in the different areas. In addition to the specific diversity there is also a great abundance of local varieties, especially of pears but also of apple, plum, myrobalan, chestnut, pomegranate, persimmon (*Diospyros Lotus*) and many other fruits. The same applies to certain small bush fruits such as dewberries, of which there are 34 species.
Many of the forms referred to possess distinct practical interest and are regarded as much more promising for use in Soviet fruit breeding than forms imported from other countries.

574. Ul'janiščev, M. 634–2.111–1.521.6(47)
**(On the path of a great horticulturist).**
Sady i Ogorody (Fruit and Vegetable Gardens) 1941 : No. 6 : 13–15.

By sowing seeds of natural and artificial hybrids the author has obtained some excellent hardy varieties of apple, apricot, vine and other fruits and ornamentals.

575. Kovalev, N. V. 634.1–2.4–1.521.6:581.9
**Immunity of fruit trees to fungus diseases.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 176–79.

*Malus*, *Pyrus* and *Cydonia* species from the humid regions of Eastern Asia and Malus species from regions of North America are resistant to fruit rot (*Monilia*) and scab (*Fusicladium*) and mostly resistant to leaf spot (*Phyllosticta*) and rust (*Gymnosporangium*).
Species of *Malus*, *Pyrus* and *Cydonia* from arid regions of Western China and Soviet Central Asia are not resistant to any of these diseases.
Species of these three genera from the climatic zone transitional between the continental and the Central European climate (Caucasus, Anterior Asia and the Balkans) are susceptible to

* See also Absts 387 and 600.

scab but without deformation of the fruits. Occasional forms resistant to scab are found and more frequently forms resistant to fruit rot.
These regularities in the geographical distribution of resistant forms can be explained in terms of the relative importance of the different diseases as selective factors under different climatic conditions.

576. KRUFT, F. 634.11:575.12
**Die Apfelsorten-Neuzüchtungen "Erwin Junge" und "Franz Späth". (The new apple varieties obtained by breeding, "Erwin Junge" and "Franz Späth").**
Dtsch. landw. Pr. 1941 : **68** : p. 104.
These two varieties were bred by Rudolf Goethe at Geisenheim. Erwin Junge was selected in 1895 from the cross Minister von Hammerstein x Gelber Bellefleur. The female parent had been selected in 1882 as a seedling of Landsberger Reinette and was subsequently used in many other successful crosses. Erwin Junge comes early into bearing, and gives abundant fruit of good flavour ripening in April-May.
Franz Späth was selected in 1896 from the cross Minister von Hammerstein x Weisser Winter Taffet. It is a large apple of good quality and resistant to bruising. It ripens in December and keeps till mid-March without loss of flavour.

577. KOKHANOVSKAYA, L. N. 634.2:575.127.2:581.036.1
**Increasing crossability between *Prunus* ssp. by temperature treatment.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 155–59.
When the cross blackthorn (*Prunus spinosa* L.) x cherry plum (*P. divaricata* Ldb.) was made in a small greenhouse and the temperature maintained at 35–40° C. for several hours each day for 2 or 3 days after pollination, the percentage set was increased from about 5% to 16·8%. Successful pollinations of blackthorn by peach and apricot were also carried out under these conditions, though with very low sets. No set was obtained from self-pollination or pollination with sweet cherry.
Preliminary embryological studies suggested that more rapid pollen tube growth at high temperatures was a factor contributing to the higher sets obtained.

578. SAMSONOV, I. M. 634.23–2.111–1.521.6(47)
**(The valuable qualities of Michurin's Ideal cherry).**
Sady i Ogorody (Fruit and Vegetable Gardens) 1941 : No. 6 : 15–16.
The variety, which has proved one of the most frost-resistant, is fully described. Both by selfing and crossing with other varieties it has given rise to a number of promising seedlings and new varieties. Its hybrids with the bird cherry show marked heterosis.

579. LAMMERTS, W. E. 634.25:581.143.26:575
**An evaluation of peach and nectarine varieties in terms of winter chilling requirements and breeding possibilities.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 205–11.
Insufficient chilling in mild winters in coastal southern California produces a marked delay in the leafing and flowering of most peaches and nectarines. These delays in leafing and flowering cause a reduction in quality and quantity of fruit. Using Lukens Honey, which over a period of 6 years has varied only 6 days in leafing and flowering, as a standard, the chilling requirements of about 50 varieties were determined by comparing their leafing dates in a number of years with that in 1937 when there was sufficient chilling for most varieties. Thus Boston nectarine leafed out 10 days later than Lukens Honey in 1937 and 66 days later in 1938—this gives it an index number of +56 in 1938. Similarly St Helena seedling, which leafed out 25 days earlier in 1937 and 61 days earlier in 1938 than Lukens Honey, has an index number of −36 for 1938. In breeding for early-ripening varieties it is suggested that advantage should be taken of the very low chilling requirements of St Helena seedling and of Chinese Dwarf. Other varieties which may be of value in breeding for low requirement are Socala, Leeton and Golden Blush.

580. MEADER, E. M. and
BLAKE, M. A. 634.25:582
**Further studies on identification of peach varieties by leaf characteristics.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 177–82.
The authors suggest that measurable leaf characteristics and leaf outlines should be used to supplement the other criteria commonly employed in the identification of peach varieties. Data are given of the length and maximum width of the leaf blade and of its apex and base angles for eight peach varieties, each variety being grown in three to five different localities.

581. CONDIT, I. J. 634.37:582
**The Brunswick (Magnolia) fig.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 143–46.
An historical and descriptive account of the Brunswick and Magnolia figs is given. It is suggested that the two varieties are identical.

## NUTS 634.5*

582. WHITEHOUSE, W. E. and
STONE, C. L. 634.574:581.162.3:631.557
**Some aspects of dichogamy and pollination in pistache.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 95–100.
The blossoming periods of pistillate and staminate trees of four pistachio species were determined for four years. Data are also given for the yields of filled nuts secured on four varieties of *Pistacia vera*, on *P. chinensis*, on *P. Terebinthus* and on *P. atlantica* using pollen from staminate trees of five species of *Pistacia*. The results indicate that proper selection of males is very important and that primary consideration should be given to providing abundant pollen at the proper time. The different pollens did not differ greatly in their effectiveness.

583. 634.58:575.11
CLOS, E. C. 634.58–1.524(82)
Los tipos de maní ("Arachis hypogaea") cultivados en la Argentina y su distribución geográfica. **[The types of groundnut (*A. hypogaea*) cultivated in Argentina and their geographical distribution].**
Physis, B. Aires 1939 : **18** : 317–29.
Collections of groundnut were made from all over the Argentine Republic and as they proved very mixed, selections were made. The 46 best lines were maintained. The characters made use of in the description are elaborated. In dealing with seed-coat colour it is reported that in a cross between a red and a black, black was dominant and that in the $F_2$ the proportions were 18 red : 31 intermediate : 14 black.
The varieties were arranged into 15 main types, which are described; a diagnostic key is also provided. The geographical distribution of the types is discussed.

## PALMACEOUS AND OTHER TREE FRUITS 634.6

584. BONDAR, G. 634.61:582(81)
Palmeiras do genero *Cocos* e descrição de duas especies novas. **(Palms of the genus *Cocos* and a description of two new species).**
Bol. Inst. Cent. Fom. Econ. Bahia 1941 : No. 9 : Pp. 53.
The author analyses and criticizes the views of earlier authors regarding the systematics of the genus. He has established the existence of some 30 genera of palms in Brazil, as opposed to 60 created by other authors. A new diagnostic key for the genus *Cocos* is presented. Descriptions are given of *C. campestris* Mart., which produces an edible oil, and of *C. picrophylla* B. Rodr., which produces large quantities of oil-bearing nuts in localities where few other plants will thrive. The two new species, *C. getuliana* Bondar n. sp. and *C. ruschiana* Bondar n. sp. are described in Latin and Portuguese. The former produces large quantities of a fibre "piassava" which is immensely strong and durable; the latter produces both fibre and oil, and grows in very infertile soil. Both are handsome ornamentals.

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* See also Abst. 377 (Groundnut).

585. Huyskamp, A. H. 634.61–2.112–1.557:581.145.2
De invloed van de droogte op de vruchtdracht van den aanplant der K. O. Talisse. (**The influence of drought on the bearing of the plantation of the Talisse Coconut Estate**).
Bergcultures 1941 : **15** : 1110–11.
The biological basis of failure in regard to fruit setting is discussed and the record harvests that on occasions follow such poor seasons after a 2-year interval are also explained.

586. Graner, E. A. 634.651:577.8:575.11
Observações sôbre a distribuição do sexo no mamão. (**Observations on the distribution of sex in papaya**).
Rev. Agric. S. Paulo 1941 : **16** : 341–57.
A female plant was crossed with a male plant and 386 fruits were obtained. A random sample of these gave rise to 27♀ and 37♂; the former were all purely female, of the male plants some bore fruits and others did not. From another similar cross 34♀ : 38♂ were obtained; some of the male plants again producing occasional fruits. In a cross between a female plant and a male plant bearing its flowers in an inflorescence resembling a female inflorescence 42♀ : 38♂ were obtained; the plant used as pollen parent was thus not a male but a hermaphrodite. The hermaphrodite flowers in the progeny varied in the number and position of stamens, in type of ovary and in form of fruit.
The author suggests that these hermaphrodite plants should be planted as pollinators with female trees and should also be subjected to selection in the attempt to produce a commercial hermaphrodite type.

587. Traub, H. P.,
Pomeroy, C. S.,
Robinson, T. R. and
Aldrich, W. W. 634.653:575(73)
**Avocado production in the United States.**
Circ. U.S. Dep. Agric. 1941 : No. 620 : Pp. 28.
Descriptions of nine varieties of avocado are given in one section of this circular and there is a very short account of breeding methods in another section.

## SMALL BUSH FRUITS 634.7

588. Williams, C. F. and 634.71–2–1.521.6:575
Darrow, G. M. 634.71:575.127.2:581.162.5
**The trailing raspberry *Rubus parvifolius* L.: characteristics and breeding.**
Tech. Bull. N.C. Agric. Exp. Sta. 1940 : No. 65 : Pp. 13.
The history of the introduction of *R. parvifolius* into Europe and America from China and Japan and a description of the plant form the first part of this bulletin. Selections, made in both Maryland and North Carolina, were nearly all self-sterile. *R. parvifolius*, which is resistant to most of the raspberry diseases, was crossed with the cultivated red raspberry. Seedlings from such crosses were intermediate in growth habit between that of their parents and were vigorous but all showed much sterility. The hybrid seedlings varied in their resistance to leaf spot diseases, some being very susceptible and others immune. Some were highly susceptible to rust, others highly resistant (very few plants being in a class between these extremes). Most hybrids showed bad summer defoliation. A few $F_2$ plants have been obtained. Attempts to improve the fertility of the hybrids by doubling their chromosome number are being made.

589. Waldo, G. F. and
Darrow, G. M. 634.711:575"793"(79.5)
**Breeding autumn-fruiting raspberries under Oregon conditions.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 274–78.
Three varieties—Lloyd George, Ranere and Cuthbert—have been used as parents having the autumn-fruiting habit in breeding raspberries adapted to Oregon conditions (the climate of Oregon is similar in many respects to that of Northwestern Europe). The percentage of early-, mid- and late-autumn bearing seedlings is given for a number of crosses. Lloyd George appears to be the best parent to use for introducing the autumn-bearing character into crosses.

590. Bailey, L. H. 634.717:582(7)
**Species Batorum. The genus *Rubus* in North America (north of Mexico).**
Gentes Herbarum, N.Y. 1941 : **5** : 201–28.

This is the fourth paper of a series dealing with the genus *Rubus* in North America (see "Plant Breeding Abstracts", Vol. XI, Abst. 1094 for the first paper of the series). Species of the section Verotriviales (previously called Persistentes)—these species are the Southern Dewberries—are described. A number of excellent horticultural varieties have been selected from the wild species *R. trivialis* and *R. mirus*. These include the Nessberry and the Marvel dewberry.

591. Araratian, A. G. 634.743:576.356.5
Mixoploidie bei *Hyppophaë rhamnoides* L. (**Mixoploidy in *H. rhamnoides* L.**).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **27** : 857–61.

The occurrence of tetraploid cells ($2n = 48$) in the root tips of seedlings of Armenian *H. rhamnoides* ($2n = 24$) is reported. In some tetraploid cells the 48 chromosomes were arranged as 24 pairs of homologues, in others they were scattered. The same phenomena were observed in *Elaeagnus angustifolia* ($2n = 28$) and are discussed in some detail.

592. Morrow, E. B. and
Darrow, G. M. 634.75:575.1:575"793"
**Inheritance of some characteristics in strawberry varieties.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 262–68.

The number of seedlings in progenies obtained by both selfing and crossing which showed winter flowering was investigated in the mild winter of 1938–39. The percentage of seedlings flowering before February 12th was much higher in the progenies obtained by selfing Blakemore and Missionary, the two most important varieties in the Willard area, than in any other progenies obtained by either selfing or crossing. Observations of early ripening were made on many progenies in 1940; 33% of the seedlings from Missionary selfed had early fruits (fruit ripe on/or before April 25th) as compared with 18% from Blakemore selfed and 1% from Fairmore and Fairfax selfed. Both N.C. 225 x Fairmore and Blakemore x N.C. 640 showed 56% of seedlings with early fruit. Data are also given for the inheritance of berry size, shape, colour and firmness, seed depth and colour, calyx characteristics and solidity and colour of flesh.

## FORESTRY 634.9

593. Mirov, N. T. 634.97:575:575.1
**Forest genetics: present status and outlook for the future.**
Proc. 6th Pacific Sci. Congr. 1940 : **4** : 727–30.

A short historical and geographical survey of work on the genetics and breeding of forest trees.

594. Schmidt, W. 634.97:575.1
Erbforschungsfragen. (**Questions of genetics**).
Allg. Forst- u. Jagdztg. 1941 : **117** : No. 1 : 1–15.

The author points out that through natural selection a number of characteristics tend to be selected together in any given set of conditions and that diagnosis of a climatic race by one feature alone usually involves these other characters too.
It is pointed out that many characters, such as branching, though hereditarily conditioned, are at the same time strongly influenced by environment.
A tendency towards twisted trunks resulting from strong phototropic reaction is again stated to be a dominant character, not recessive as some of the author's critics will have it. Twisted trees may thus bear a number of normals in their progeny. Their proportion will naturally depend on the composition of the population from which the trees are taken. This is in turn influenced by natural selection, twisted types for instance being incapable of surviving in regions with heavy snow.

595. 634.97:575.125
WETTSTEIN, W. von 634.97:576.356.5
Wuchssteigerung durch Kombinationszüchtung und Chromosomenvermehrung. (**Increasing growth by crossing and by chromosome duplication**).
Forstarchiv 1941 : **17** : 80–83.

Reference is made to the increased size and vigour of many interspecific hybrids in *Larix* and in *Betula*. In the latter genus the hybrid nature of a seedling can often be demonstrated by chromosome counts, since in *B. verrucosa* $n = 14$ and in *B. pubescens* $n = 28$. In *Populus*, heterosis has been observed in both interspecific and interracial crosses (see "Plant Breeding Abstracts", Vol. VIII, Abst. 1631).
Planting material of hybrids showing heterosis can in some species be obtained by artificially pollinating flowering twigs in the greenhouse, in others by grafting the twigs of the seed parent into the pollinator, and in others by vegetative propagation from good hybrids.
Various examples of size increase due to polyploidy are cited and it is stated that many polyploid plants of elm, oak, beech and poplar have been produced at Müncheberg by treatment with colchicine and are being subjected to further study.

596. DEVOTO, F. E. 634.97:575.127.2
Las hibridaciones entre especies forestales y sus frecuentes hibridaciones naturales en nuestro pais. (Un híbrido artificial entre "Chorisia insignis" y "Chorisia speciosa"). (Resumen). [**Hybridization between forest species and their frequent natural hybridization in our country. (An artificial hybrid between *C. insignis* and *C. speciosa*).** (**Abstract**).]
Physis, B. Aires 1939 : **18** : 369–74.

A number of instances of natural hybridization between species of forest trees observed by the author in an extensive tour of Europe are cited. These include hybrids of *Platanus orientalis* x *P. occidentalis*, hybrids between *Cupressus sempervirens* and *C. macrocarpa* and various other *Cupressus* hybrids. Reference is made to hybrid poplars immune to *Napicladium tremulae* obtained by Giacometti in Turin and others immune to *Melampsora*, both of which have been introduced into Argentina.
In the Paraná delta natural hybrids of *Salix Humboldtiana* x *S. babylonica* have been found and the same cross has been successfully effected artificially. In the Sierra de Córdoba *Juglans* species x *J. regia* natural hybrids have been found and have proved resistant to *Pseudomonas juglandii*; the seed parent was a species introduced from Peru and thought to be allied to *J. neotropica* Diels., a composite species.
Other interspecific hybrids reported are *Eucalyptus globulus* x *E. Viminalis* and hybrids have been produced artificially of *Chorisia insignis* x *C. speciosa* and *Bauchinia variegata* Linn. x *B. forficata* Link. var. *candicans* (Benth.) Hassl. The desirability of establishing an institute for the study of these problems is urged.

597. PJATNITZKY, S. S. 634.972.1:575.127.2:582
Neue experimentell erhaltene Hybridformen der Eichen : x *Quercus Miczurinii* und x *Quercus Wyssotzkyi*. (**New experimentally produced hybrid forms of oaks : x *Quercus Miczurinii* and x *Quercus Wyssotzkyi***).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 851–53.

Two new hybrid oaks are described, x *Q. Miczurinii* from the cross *Q. macranthera* female by *Q. borealis* Mich. var. *maxima* Asch. and x *Q. Wyssotzkii* from the cross *Q. macranthera* female by *Q. Robur*. The new hybrids are intermediate between their parents in some characters, resemble one or other parent in other characters and also have characteristics not found in either parent.

598. 634.972.3:575(47)
GORŠENIN, N. M. (Editor) 634.975:575.127.2:632.112–1.521.6
(**Summary of research work for the year 1938**).
Vsesojuznyi N.I. Agrolesomeliorativnyi Inst. (VNIALMI). Moscow 1940 : Pp. **172**.

In the section on acclimatization and breeding forest trees, reference is made to observations that have been made on 240 interspecific larch hybrids (1933 crosses) and on poplar hybrids.

The most drought-resistant hybrids were found in the drought of 1937 to be the hybrids between Siberian and Japanese larch. Three of the hybrids bore fruit for the first time in 1938, the cones being only half the normal size. The Siberian x Japanese hybrids were the largest (56 cm.) in the summer of 1938, the next largest (50 cm.) being the European x Japanese hybrids; the former proved also to be frost-resistant and are therefore recommended for planting.

A further 249 one year and two year seedlings from 1936–37 crosses were also planted out in the autumn of 1937. Of these the most drought-resistant proved to be the Siberian x Japanese and Siberian x European (with a survival of 55%) and the least resistant were the Japanese x Siberian (with a survival of 49%).

Three hundred hybrids from crosses in 1933 and 1936 were examined. The aspen x white poplar hybrids, 18 in number, contained 4 dwarfs which at the age of five years were only 30–40 cm. in height. Of the others, 3 were 70–100 cm., as compared with 50 cm. for aspens of the same age.

Balsam poplar x Berlin poplar hybrids, 164 in number, had an average height of 24 cm., the best being 84 cm.; Moscow x Berlin poplar hybrids, 43 in number, had an average of only 13 cm.; Berlin poplar x Chinese poplar hybrids were also very poor growers.

Various experiments on acclimatization of exotic trees are described and indications are given of the species that proved most drought-resistant.

599. LUBJAKO, M. N. 634.975:581.143:575.42

**(Selection of quick-growing forms among local forest species).**

Lesnoe Khozjaistvo (Forestry) 1941 : No. 5 : 28–32.

Progenies from 22 individual pine trees were sown separately in 1934. In 1938 height measurements were made on 2,315 plants. The progenies of different trees differed in height of the five year old trees.

A further set of progenies of 27 trees, sown in 1926, at 13 years of age had an average height of 234·2 cm., whilst the progeny of tree No. 1 was 153·2 cm. and that of tree No. 10 was 313·5. The average diameter at 0·5 m. from the ground was 2·63 cm. in No. 1 and 4·95 cm. in No. 10. There was however great variation from tree to tree within each progeny and even the best progeny contained over 20% of individuals below the average for the worst. Selection by progenies does not ensure the production of exclusively vigorous forms. However, 11 year old progenies of first quality stands measured in 1938 proved more than double those of third quality stands in diameter, and 1·8 times in height.

The differences in vigour are not always manifested in the first two years and true hereditary differences can be detected only in the third or fourth years of growth. Even that age is regarded as too early for selection, which should be carried out by planting a dense stand and thinning out the inferior trees.

## VEGETABLES 635*

600. 635:575(49.4)

MEIER, K. 634:575(49.4)

Bericht der Eidgenössischen Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil für die Jahre 1935/1937. **(Report of the State Research Institute for Fruiticulture, Viticulture and Horticulture in Wädenswil for the years 1935–1937).**

Landw. Jb. Schweiz. 1940 : **54** : 389–464.

This report, which covers three years, deals with the following problems in fruiticulture—stocks, descriptions, breeding and testing of varieties, and fertilization and fruit formation.

The new Zwetschgen Ruth Gerstetter and the Kellerbirne pear have already been announced. Both are remarkable as early varieties. Much work has also been accomplished on fertilization and fruit formation in cherries, apples and pears and on the distribution of cherry varieties in German Switzerland.

Vine breeding operations included the crosses of [Riesling x Sylvaner] x Räuschling and [Riesling x Sylvaner] x Gutedel; from these several vines of merit for dessert or wine making purposes were obtained. In 1935 and 1937, judging from small quantities of wine made from about 30 stocks, the bouquet of these wines proved to be very varied. The cross Blauer

* See also Abst. 378.

Burgunder [Blue Burgundy] x Schwarzer Veltliner [Black Veltlin, a Gamay form] produced almost exclusively weakly vines of poor fertility. A quarter of them had white berries and yellow autumn colouring.
New crosses were carried out partly with a view to obtaining resistant hybrids with good yielding capacity and partly to get early, blue berried *Vinifera* varieties that could be used for the production of red wine vines even in less favourable situations.
A considerable amount of work was also done on the cultural merits of different varieties of vines whose performance in a number of districts is recorded.
Research on the value and use of various hybrid and other stocks when grafted with different scions and their effect on the yield was also conducted.
Records of performance of direct producers including some of the newer varieties showed that none was of any great merit.
The breeding of various types of *Primula malacoides* as an ornamental and of berry fruits and of onions and other vegetables received attention. The four best new varieties of raspberries —one white and three red—are now being further propagated on a larger scale and the breeding of garden strawberries has proceeded with earliness and resistance to *Tarsonemus fragariae* as the main objects. Resistance is particularly difficult to breed for, as the same varieties do not show the same resistance in different soils.
Experiments on the improvement of the everbearing strawberry are being conducted with as initial material "Wädenswiler Rankenlose", a variety that is indistinguishable from the new German productions Rügen and Baron Solemacher. Crossing with the qualitatively highly superior wild *Fragaria viridis* gave fully fertil $F_1$ with tendrils, while the $F_2$ segregated into forms with and forms without tendrils and is at present under observation.
Though particularly difficult, efforts are being made to breed thornless blackberries by crossing the spineless variety produced by Luther Burbank with the Theodor Reimer's Swiss variety or the "Farnblättrige" [fern-leaf]. The $F_1$ is mostly sterile and the partial fruits that mature often contain infertile seeds. None of the $F_2$ seedlings so far obtained have been spineless.
Selfing and selection of onions have given very varied progeny as regards uniformity and keeping quality; it should therefore be possible to improve the Swiss collection of varieties by breeding to begin with from the best of the types that have been obtained by initial selection.
The pedigree Thurner strain of cabbage has shown admirable uniformity when seed from different districts was used for comparative trials. The Wädenswil selection of the Thurner White cabbage gave yields averaging between 368 and 816 kg. per acre, as compared with unselected commercial seed for which the corresponding figures were 351 and 958]. As the Wädenswil selection has rather too small a head, another strain with heavier and larger heads is being bred. Selection is also proceeding with an Amager strain to obtain a good, uniform Amager type of good keeping quality.
Of the two Wädenswil headed lettuce varieties, Wädenswil selection and Cazard (both intended for summer use), the latter appears the most popular.
The Wädenswil selection of the Juli runner bean, which has been brought to a stage of very considerable uniformity, has now reached the stage of commercial seed production.
A Wädenswil selection of cucumber for raising under glass is also available for growers.

601. COULTER, F. C. 635.13:576.16
**The story of garden vegetables. VI. Carrot: one of France's great contributions to the garden.**
Seed World 1941 : **50** : No. 7 : 20–21.
Historical references to carrots and a brief descriptive list of the leading American varieties are given.

602. TATEBE, T. 635.15:575.11.061.6
**(Studies on the inheritance of color in the Japanese and Chinese radish).**
Bot. & Zool. 1937 : **5** : 1301–08.
The following factors for root colour were found in Japanese and Chinese radishes—*G* for pale green neck (hypocotyl), *vg* for white neck and three members of a multiple allelomorphic series, *R* for red, $R^s$ for red striping and *r* for white. The factors *R* and $R^s$ also produce reddish colour and red striping respectively of the petioles and midribs. *R* and $R^s$ are equistatic, the

roots of $F_1$ plants from the cross red x red striping being red in their upper parts and pale red with red striping in the lower parts. Both *R* and $R^s$ are domiant to *r*.

603. MAGRUDER, R. et al. 635.25(73)
**Descriptions of types of principal American varieties of onions.**
Misc. Publ. U.S. Dep. Agric. 1941 : No. 435 : Pp. 87.
After a short introductory section, twenty-one varieties of onions are described. Each variety is described under the following headings—brief characterization, adaptability and use, season, plant (leaves and sheath column), mature cured bulb, synonyms and history. The type of bulb is illustrated by two full page plates for each variety. There is also a coloured plate illustrating the bulb colour of twelve varieties. The introductory section discusses the following topics—object and results of type studies, methods of procedure, important considerations in comparing onion varieties or strains with type descriptions or standards, influence of environment on varietal characters and developmental history of shape in the onion.

604. NEWCOMER, E. H. 635.34:576.356.5:581.04
**A colchicine-induced tetraploid cabbage.**
Amer. Nat. 1941 : **75** : p. 620.
Tetraploid cabbages were obtained by treating seedlings with 0·2% colchicine solution. The tetraploids are about as fertile as the diploids. Crosses between diploid and tetraploid produce seed only when the diploid is used as male parent.

605. HAGA, T. 635.41:577.8
**(The sex ratio in spinach).**
Bot. & Zool. 1938 : **6** : 1573–74.
The sex ratios in 12 commercial races of spinach were determined. Of the total number of plants, 51·8% were males, 40·5% females and 8·0% intersexes—a ratio of approximately 5 males : 4 females : 1 intersex.

606. THOMPSON, R. C.,
WHITAKER, T. W. and
KOSAR, W. F. 635.52:575.127.2:576.356.5
**Interspecific genetic relationships in *Lactuca*.**
J. Agric. Res. 1941 : **63** : 91–107.
Details are given of 81 attempted interspecific crosses among 18 *Lactuca* species, two of these species having a chromosome number of $n = 8$, twelve of $n = 9$ and four of $n = 17$. Viable embryos and hybrid seedlings were obtained from 29 crosses. Eleven of the successful crosses produced hybrids which were self-fertile. Other crosses produced either vigorous, self-sterile hybrids or abnormal seedlings unable to survive beyond the rosette stage.
The results indicate that the 9-chromosome species, *L. indica, L. laciniata, L. tartarica* and *L. raddeana*, are closely related genetically and that there is also another group of 9-chromosome species *L. sativa, L. Serriola, L. altaica, L. saligna* and *L. virosa*. No hybrids were obtained from attempted crosses between 9-chromosome species of different groups, but crosses between the related species of either group usually produced fertile hybrids. The four 17-chromosome species, *L. spicata, L. canadensis, L. graminifolia* and *L. floridana*, were also found to be closely related. Crosses between the 17-chromosome species and the 9-chromosome species of the *L. indica* group were successful but crosses between the 17-chromosome species and the 9-chromosome species of the *L. Serriola* group failed in nearly every case.

607. MORRISON, G. 635.52–2–1.521.6:575
**The story of lettuce. Some of the interesting developments behind the improved varieties of today.**
Nat. Seedsman 1941 : **8** (3) : 22–25.
Special mention is made of the Imperial disease-resistant strains of New York lettuce which have been bred by Dr. I. C. Jagger of the U.S. Department of Agriculture. Imperial followed by a number indicates that the strain is resistant to brown blight while Imperial followed by a letter indicates that the strain is resistant to both brown blight and mildew.

608. WHITAKER, T. W. 635.53:575.127.2:576.356.5:576.354.4
**The occurrence of a spontaneous triploid celery.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 346–48.
A single triploid plant ($2n = 33$) was found among plants of *Apium prostratum*. It was apparently formed by the fertilization of an unreduced egg cell of *A. prostratum* by a reduced sperm of *A. graveolens*—both *A. prostratum* and *A. graveolens* have a gametic chromosome number of $n = 11$. The triploid hybrid is intermediate in many characters between its two supposed parents. At meiosis the triploid forms 11 bivalents and 11 univalents.

609. WONG, C. Y. 635.6:581.163:577.17
**Chemically induced parthenocarpy in certain horticultural plants, with special reference to the watermelon.**
Bot. Gaz. 1941 : **103** : 64–86.
Flowers of water-melons, cucumbers, musk-melons, pumpkins, squashes, peppers, tomatoes, egg-plants and strawberries were treated with the following synthetic growth substances—naphthalenacetic acid, potassium naphthalene acetate, indolebutyric acid, colchicine, acenaphthene, sulfanilamide and trimethylamine. A mixture of two growth substances gave better results than one alone. Naphthalenacetic acid had a greater effect on parthenocarpic development than any other growth substance. There were great variations in fruit size and seed-coat development in the parthenocarpic fruits.

610. ARENKOVA, D. N. 635.611:576.356.5:581.04
**Acenaphthene-induced tetraploidy in muskmelons.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 1028–29.
Diploid-tetraploid chimaeras were obtained by sprinkling dry musk-melon seeds with acenaphthene, wrapping the seeds in moist blotting paper and then keeping them for 7 days at a temperature of 20–25° C.
Plants grown from large seeds produced by these chimaeras were found to be tetraploids ($2n = 48$). Occasional octoploid metaphases ($2n = 96$) were found in their roots.

611. POOLE, C. F.,
GRIMBALL, P. C. and 635.615:575.061.6:581.48
PORTER, D. R. 635.615:575–181.12:581.48
**Inheritance of seed characters in watermelon.**
J. Agric. Res. 1941 ; **63** : 433–56.
In the water-melon (*Citrullus vulgaris*) the seed length ranges from 5·5 mm. to 15·5 mm. and the seed-coat colours range from an almost pure white through red, green, tan and mahogany to black. The seed-coat colours may also be arranged in various patterns. The three seed-length types used in this study were short (average length about 6 mm.), medium (about 10 mm.) and long (about 13 mm.). The cross medium (suggested genetic constitution *LLSS*) x long (*llSS*) gives an $F_2$ segregation of 3 medium: 1 long, the cross medium (*LLSS*) x short (*LLss*) gives an $F_2$ segregation of 3 medium: 1 short and the cross long (*llSS*) x short (*LLss*) an $F_2$ segregation of 9 medium (containing both *L* and *S*): 3 long (containing *S* and homozygous for *l*): 4 short (3 containing *L* and homozygous for *s*, plus the double recessive, *llss*). Both $F_3$ and back-cross generation segregations supported this explanation of the inheritance of the three seed-length types. The following seed-coat colours were studied—black, clump, tan, white-tan-tip and white-pink-tip. The analysis of $F_2$, $F_3$ and back-cross populations suggested that these colours and patterns were determined by interaction of 3 genes (*R*, *T* and *W*) plus a modifier, *D*, which can operate on black alone. Black seed-coat is produced by the action of all three dominants, *R*, *T* and *W*; clump by *R* and *T* plus *ww*; tan by *R* and *W* plus *tt*; white-tan-tip by *R* plus *ttww*; red by *W* plus *rrtt*; white-pink-tip by *rrttww*. Plants containing *R*, *T* and *W* and homozygous for *d* have seed-coats with the black pigment restricted to dots more or less uniformly distributed. The genes *L* and *W* were found to be linked.

612. HUTCHINS, A. E. and
CROSTON, F. E. 635.62:575–18:575.125
**Productivity of $F_1$ hybrids in the squash, *Cucurbita maxima*.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 332–36.
The following data are given for ten $F_1$ crosses and their parents—total yield, yield of mature

fruits, average weight of mature fruits, number of fruits per plant and number of days from sowing to opening of first female flower. Seven $F_1$'s produced a significantly higher total yield than that of the higher yielding parent and three a total yield equal to that of the higher yielding parent. In general the $F_1$ weight per fruit was greater than the mean of the parents, the number of fruits per $F_1$ plant was equal to or slightly exceeded the mean of the parents and the $F_1$ hybrids were somewhat earlier than the mean of the parents. Three reciprocal crosses between large and small seeded varieties showed significant increases in total yield of those $F_1$'s which had the larger seeded variety as the female parent over the reciprocal crosses. Eight other reciprocal crosses showed no such differences.

613. CONTARDI, H. G. 635.62:575.11:581.6
635.62:582:575.127.2

Estudios genéticos en "Cucurbita" y consideraciones agronómicas. (**Genetical studies in *Cucurbita* and agronomic considerations**).
Physis, B. Aires 1939 : **18** : 331–47.

The technique employed in hybridization is described. The preliminary classification into bitter and sweet was effected by means of the moth *Diabrotica speciosa*, which devoured the bitter fruits and left the sweet alone altogether.
The $F_1$ of *C. maxima* and the wild species *C. Andreana* bore exclusively bitter fruits; the plants were vigorous and extremely fertile. In $F_2$, back-cross and $F_3$ progenies bitterness behaved as a simple dominant.
*C. Andreana* is a very common weed in S. America and in its presence *C. maxima* shows an almost greater tendency to out-pollination than to selfing, with diasastrous results on the quality of the fruits.
With *C. Pepo* on the other hand *C. Andreana* proved almost completely sterile, and *C. Andreana* is therefore regarded as the *agrestis* form of *C. maxima*. A high set of fruits was obtained in crossing *C. Andreana* with *C. ficifolia* but most of the seeds were imperfect.
On examining the progeny of two sweet plants growing in the vicinity of wild plants one of them proved to contain 26% and the other 21% of plants with bitter fruits. A number of bitter plants found in nature also segregated in their progeny and proved to be natural hybrids; a case in point is the so-called bitter gourd of the province of Cordoba (Zapallo amargo de Córdoba).

614. FILOV, A. I. 635.63:582:581.9

**A tentative classification of cucumbers based on their ecological evolution.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **26** : 811–14.

All cucumbers are placed in a single species, *Cucumis sativus* L. Seven subspecies are suggested—*agrestis* (the wild Himalayan cucumber), five agroclimatic types of cultivated cucumbers (subspecies *europaeo-americanus*, *occidentali-asiaticus*, *chinensis*, *indo-japonicus* and *himalaicus*) and the cultivated hermaphrodite form, subspecies *hermafroditus*. The characteristics of these subspecies and the climatic conditions to which they are adapted are described.

615. LESLEY J. W. and
LESLEY, M. N. 635.64:575.061.63:581.162.5

**An hereditary variegation in tomatoes associated with sterility.**
Amer. J. Bot. 1941 : **28** : p. 727. (Abst.).

Branches that are lighter coloured than the rest of the plant and that are wholly sterile occasionally occur on tomato plants. Light green streaks and sectors are also common on leaves and stems. In these lighter areas in leaves no pallisade tissue is present. $F_1$ and $F_2$ plants from the cross variegated female x normal male were all more or less variegated and mostly unfruitful. The variegation was not transmitted to normal plants either by rubbing the leaves with pieces of variegated tissue or by inserting such pieces into their stems.

616. LARSON, R. E. 635.64:575–18:575.125

**The $F_1$ combining ability of certain tomato varieties.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 313–14.

The total yields, earliness and fruit size and shape are recorded for 19 $F_1$ tomato hybrids and

their parents. Earliness, size of fruit and shape of fruit of $F_1$ hybrids are intermediate between those of the parents. It is suggested that the factors for greater yield are dominant in most $F_1$ hybrids but that the complementary effect of genes for yield produces in several crosses an $F_1$ which is higher yielding than either parent. None of the parents of the highest yielding crosses were high in productivity.

617. MacArthur, J. W. 635.64:575–181:581.47
**Size inheritance in tomato fruits.**
J. Hered. 1941 : **32** : 291–95.

The fruit sizes of six $F_1$ tomato hybrids between the following varieties—Red Currant, Yellow Cherry, 902 selection and Tangerine—were found in five cases to approximate to the geometrical mean of the parental sizes and not to the arithmetical mean. The exceptional case (902 x Tangerine) had fruits larger than the sizes calculated on either the geometrical or arithmetical mean hypotheses. This case differs from the other five in that the parental fruit sizes were not very different.

618. Lyon, C. B. 635.64:575"793":575.127.2
**Inheritance of stages of earliness in an interspecific cross between *Lycopersicon esculentum* and *L. pimpinellifolium*.**
J. Agric. Res. 1941 : **63** : 175–82.

The tomato cross studied was Johannisfeuer (*L. esculentum*) x Red Currant (*L. pimpinellifolium*) and the generations studied were the parents, $F_1$, $F_2$, both the back-crosses, selected $F_3$ and advanced back-cross generations. The parents, $F_1$, $F_2$ and the two back-crosses have been previously studied (see "Plant Breeding Abstracts", Vol. XII, Abst. 620). The lengths of the following stages were determined—period from planting to first flower opening before hail storm, period from planting to first flower opening after hail storm, period from first flower opening after hail storm to first fruit set, period from first fruit set to first complete colour change and period from planting to first complete colour change. The effect of the hail storm was uniform over the entire experiment and it left only stubs of plant stems above ground. Before hail damage Red Currant was 7 days earlier than Johannisfeuer in opening of first flower and after hail damage only 4 days earlier. The $F_3$ strains that showed earliness of date of first flower before the hail storm showed no indications of such earliness after the hail storm. Only minute differences in length of the stage from flower opening to first fruit set were found. Significant differences were found between the parents for the period from first fruit set to first complete change of colour of any fruit, and the $F_1$ showed heterosis for this character. It was also possible to select $F_3$ strains which were earlier than either parent for this stage. $F_3$ strains that were earlier than either parent were also obtained for the period of time of planting to first flower opening before the hail storm.

619. Powers, L. 635.64:575.125:575–18:575.127.2
**Inheritance of quantitative characters in crosses involving two species of *Lycopersicon*.**
J. Agric. Res. 1941 : **63** : 149–74.

The material studied in this investigation was the same as that used by Powers and Lyon in studies on the developmental stages in *Lycopersicon* crosses (see "Plant Breeding Abstracts", Vol. XII, Abst. 620). The five characters studied in this investigation were weight of fruits, number of locules per fruit, number of fruits per centimeter of branch, plant height and plant spread. Small size of fruit was found to be partially dominant to large size and small number of locules per fruit was also partially dominant to large number of locules. The results for the character number of fruits per centimeter of branch showed that both dominance and heterosis for this character depended upon both the cross and the environmental conditions as represented by the year in which the cross was grown. It is concluded that most crosses show heterosis for plant height. For the cross Johannisfeuer x Bonny Best, however, plant height approaches intermediacy or no dominance. All crosses show heterosis for plant spread, heterosis being particularly pronounced in crosses involving Red Currant. The theoretically expected values of the mean weight of fruits and mean locules per fruit were calculated for the $F_1$ and the two back-crosses from the parental and $F_1$ values, assuming that the action of genes is arithmetically cumulative and assuming it to be geometrically cumulative. There

is a very poor fit for weight of fruits observed and the calculated values assuming gene action to be arithmetically cumulative. The fit on the geometrically cumulative hypothesis is better but it is evident that some unknown factor is exerting an influence. The results for number of locules per fruit are similar. The subjects considered in the discussion are plant-breeding methods utilizing heterosis and dominance, the application of heterosis and dominance to tomato breeding, the relation of heterosis and dominance and the nature of interactions of genes.

620. Powers, L. and
Lyon, C. B. 635.64:575.125:575"793":575.127.2
**Inheritance studies on duration of developmental stages in crosses within the genus *Lycopersicon*.**
J. Agric. Res. 1941 : **93** : 129–48.

The lengths in days of the following three stages in the development of tomato plants—period from sowing to first flower opening, period from first flower opening to first fruit set and period from first fruit set to first complete change of colour of any fruit—were studied in the two parents, the $F_1$ and $F_2$ generations and the two back-cross generations of the $F_1$ to both parents in the following crosses—Johannisfeuer x Red Currant, Danmark x Johannisfeuer, Danmark x Red Currant and Johannisfeuer x Bonny Best. Red Currant is a variety of *L. pimpinellifolium* and the other three varieties all belong to *L. esculentum*. The parents and the various generations of the crosses were all grown in the same year. The cross Johannisfeuer x Red Currant was grown in both 1937 and 1939 and the cross Danmark x Johannisfeuer in both 1938 and 1939. The other two crosses were each grown during one year only. The results show that the three subdivisions of the period from sowing to first complete change of colour of any fruit which were studied are biologically sound. One or more crosses showed heterosis in the $F_1$ for each stage of development. Heterosis was also found in some cases to be dependent on the environment, occurring in one year but not in the other. The data were of no value in determining whether the effects of genes are arithmetically or geometrically cumulative. The possibility of using $F_1$ seed to produce commercial tomato crops is discussed with special reference to earliness.

621. Lyon, C. B. 635.64:581.143:581.04:575.127.2
**Responses of two species of tomatoes and the $F_1$ generation to sodium sulphate in the nutrient medium.**
Bot. Gaz. 1941 : **103** : 107–22.

Plant height, dry weight of vines and of root system, total fresh weight and number of immature fruits produced by plants 87 days old, the density and mean weight of ripe fruits and the diameter of stems were determined for tomato plants of the varieties Johannisfeuer and Red Currant and of the $F_1$ hybrid from these two varieties, the plants being grown in four concentrations of sodium sulphate ranging from 4·6 to 124·6 milliequivalents of sulphate ion per litre of nutrient solution. The effect of the sodium sulphate treatment was usually similar for both the varieties and their $F_1$ hybrid. In some cases, however, the sodium sulphate treatment had a depressing effect on Johannisfeuer and the $F_1$ hybrid but no effect on Red Currant.

622. Janes, B. E. 635.64:581.163:577.17:581.6
**Some chemical differences between artificially produced parthenocarpic fruits and normal seeded fruits of tomato.**
Amer. J. Bot. 1941 : **28** : 639–46.

Parthenocarpic fruits were produced by indole butyric acid and indole acetic acid treatment and by the use of pollen of *Lycopersicon peruvianum* Mill. The acidity, percentage dry weight and the soluble solids, total sugars and starch concentrations in such fruits at various ages were compared with those found in normal fruits. The differences between the two types of fruits were found to be located almost entirely in the locules. It is suggested that such differences in the chemical compositions of the fruits are due to the influence of the developing seeds.

623. Yosida, S. 635.64:581.165.71:576.356
**(On the meiotic division of the pollen mother cells of a few intergeneric grafts in Solanaceae).**
Bot. and Zool. 1937 : **5** : 2031–37.
The following intergeneric grafts were made—tomato (varieties Best of All and Carter's fruit) on *Datura Tatula* and *Petunia* species on *Solanum nigrum*. Meiosis and pollen formation in the tomatoes and *Petunia* was normal and no irregularities (contrast the results of Kostoff, "Plant Breeding Abstracts", Vol. I, Abst. 268) were observed.

624. Filov, A. I. 635.646:582:581.9
**An agro-ecological classification of eggplants and a study of their characters.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **26** : 815–18.
The species *Solanum Melongena* L. is divided on taxonomic grounds into four cultivated subspecies and a number of wild forms. The wild forms, which are found only in India, are not described in this paper. The four cultivated subspecies are climatypes of the great ecological zones of Asia. They are *occidentale* Gaz. which arose in Western Asia Minor under conditions of adequate humidity and high temperature, the East Asiatic subspecies *orientali-asiaticus* Fil. which had its origin in Japan and China under conditions of spring and autumn cultivation (this subspecies is characterized by a high degree of cold resistance), the Palestinian subspecies *palestinicum* Fil. which is adapted to withstand high temperatures and the Arabian subspecies *arabico-italicum* Fil. (= *S. ovigerum* Dun.) which has bitter fruits and is only of ornamental value. The subspecies *occidentale* is divided into six ecotypes (or proles) and the subspecies *orientali-asiaticus* into three groups of varieties.

625. Howard, F. L. and
Desrosiers, R. 635.646–2.482–1.521.6
**Studies on the resistance of eggplant varieties to *Phomopsis* blight.**
Proc. Amer. Soc. Hort. Sci. 1941 : **39** : 337–40.
The resistance of 106 samples of eggplants (*Solanum Melongena*) to *Phomopsis vexans* was determined in greenhouse and field trials. Most varieties are very susceptible. Two collections of the "Gilo" variety (a tall shrub with small red fruits) from Brazil were immune. Experiments on the nature of the resistance to *Phomopsis* were also carried out.

626. 635.648:582(49.7)
Popoff, P. 635.648–1.524(49.7)
**[Contribution to the study of okra (*Hibiscus esculentus* L.) found in Bulgaria].**
Rev. Inst. Rech. Agron. Bulg. 1939 : **9** : No. 1 : 3–15.
Having discussed the nomenclature of *H. esculentus*, the distribution of certain types in Bulgaria and in other countries, its uses and the paucity of literature on this plant in European countries, the author stresses the importance of studying the local forms in Bulgaria and of formulating descriptions of existing types.
The rather contradictory data available from European and other sources on the origin and history of okra are also summarized.
The material for the present study, made at the Plovdiv Agricultural Experiment Station, was obtained from the main Bulgarian regions of distribution.
The morphological features of the different varieties were recorded, e.g. the branching habit, and characteristics of the leaves, flower, fruits, and seeds. Investigation of the biology of flowering showed that though the plant was mainly self-pollinated, yet insects do visit the plant and cross-pollination, though rare, cannot therefore be completely excluded.
The chemical composition of the seeds and their 1,000 grain weight were also determined.
The botanical classification of okra according to the material studied by various authors is briefly reviewed. The plants from Bulgarian sources, examined in the present study comprised the four botanical varieties, *elongatus*, *sanguineus*, *vulgaris* and *Zhukowskii* and their relation to the Asiatic varieties is considered. The three horticultural varieties known in

Bulgaria and here described in detail are: Kavaliiska (which consists mainly of *vulgaris* with an admixture of *Zhukowskii*), Tsarigradska (var. *elongatus*—also called Leskovska) and Červena (var. *sanguineus*—also called Plovdiv or Pazardžiška).

627. Savchenko, P. F. 635.651:575.243:537.531:576.312.34
**Experimental modification of the chromosomes of a phyletically primitive type.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1940 : **27** : 1024–27.

The chromosomes of *Vicia narbonensis* L. ($n = 7$), the wild progenitor of the cultivated *V. Faba* L. ($n = 6$), are more symmetrical (i.e. the two arms of the chromosomes are more nearly of equal length) than those of *V. Faba*. Seeds of *V. narbonensis* were irradiated with X-rays and the chromosome changes studied in the cells of the root tips. There was no preponderance of chromosome changes leading to asymmetry over those resulting in greater symmetry. The rate of elimination of the modified chromosomes was also studied and it was found that those with one long arm decreased in number faster than the V-shaped ones.

628. Wade, B. L. 635.652:575.061.633
**Genetic studies of variegation in snap beans.**
J. Agric. Res. 1941 : **63** : 661–69.

A variegated plant of hybrid origin was found in a stock of U.S. No. 5 Refugee snap bean (*Phaseolus vulgaris*). A variegated pure line from this plant was crossed reciprocally with Black Valentine and observations made on the $F_1$, $F_2$, $F_3$ and $F_4$ generations. The $F_2$ segregation of 27 normal to 37 variegated suggested that the variegated character is due to any one of three recessive factors and that the normal condition is due to the complementary action of the dominant genes. This suggestion was verified by the examination of $F_3$ and $F_4$ segregations—3:1 and 9:7 ratios being observed. The variegation was found to fluctuate considerably in the degree of its expression. The reasons for this are not known.

629. Prakken, R. 635.652:575.11.061.6
**Inheritance of colours in *Phaseolus vulgaris* L I.**
Genetica 1940 : **22** : 331–408.

The colour characteristics of the six parent types or races used in the crosses are described, using Ridgway's Color Standards and Oberthür's Répertoire de Couleurs, as follows:—

1. "Citroen" race, *PP* $\widehat{Cm}$ $\widehat{Cm}$ *dd sh sh GG bb* $v_{lae}$ $v_{lae}$.

2. Hilum ring type, *PP* $\widehat{cM}$ $\widehat{cM}$ *DD sh sh gg bb* $v_{lae}$ $v_{lae}$. Segregated from the cross Wagenaar x Fijne tros.

3. Pale yellowish buff, *PP* $\widehat{cM}$ $\widehat{cM}$ *DD Sh Sh gg bb* $v_{lae}$ $v_{lae}$. Segregated from the cross Wagenaar x Fijne tros.

4. Mat yellowish, *PP* $\widehat{Cm}$ $\widehat{Cm}$ *DD sh sh gg bb* $v_{lae}$ $v_{lae}$. Segregated from the cross Wagenaar x Fijne tros.

5. "Wagenaar" race, *PP* $\widehat{Cm}$ $\widehat{Cm}$ *DD Sh Sh gg bb* $v_{lae}$ $v_{lae}$.

6. Yellow-brown, *PP* $\widehat{Cm}$ $\widehat{Cm}$ *DD Sh Sh GG bb* $v_{lae}$ $v_{lae}$. A race of uncertain origin.

In the $F_2$ families discussed, only the following three new, self-coloured seed coat types were found:—

mat yellowish with yellow-brown caruncula stripe, *PP* $\widehat{Cm}$ $\widehat{Cm}$ *DD sh sh GG bb* $v_{lae}$ $v_{lae}$; pale yellow-brown, *PP cM cM D* or *d Sh Sh GG bb* $v_{lae}$ $v_{lae}$ and white, *PP* $\widehat{cM}$ $\widehat{cM}$ *dd sh sh G* or *g*.

The following crosses were made:—
1. Wagenaar x Yellow brown, 2. Wagenaar x Mat yellowish, 3. Yellow-brown x Mat yellowish, 4. Wagenaar x Citroen, 5. Citroen x Yellow-brown, 6. Wagenaar x Hilum ring type, 7. Citroen x Hilum ring type, 8. Citroen x Pale yellowish buff (which comes from the cross Wagenaar x Fijne tros) *PP* $\widehat{cM}$ $\widehat{cM}$ *DD Sh Sh gg*.
Details are given of the genetic composition of the $F_1$ and $F_2$ with regard to seed coat colour.
In the discussion, the author seeks to co-ordinate his data with those of Kooiman (1920), Sirks

(1922), Lamprecht (1932–'40) and Prakken (1934). Three different types of genetic factors are recognized as taking part in the inheritance of seed coat colour of *Phaseolus vulgaris*:—
(*a*) Basic factor; this must be dominant for the production of colour in the seed coat.
(*b*) Complementary factors; together with the basic factor, these produce a definite, very pale colour.
(*c*) Modifying factors; these only intensify or modify the colours produced by the co-operation between the basic factor and the complementary factors.
The following factors are discussed in the present paper:—

1. *P* basic factor. In all *pp* plants the seed coat is white (and the flowers). *P* plants, but with complementary factors all recessive, are also white-seeded.
2. C (or $\widehat{Cm}$) factor(s) for ever-segregating mottling. $P\widehat{Cm}\widehat{Cm}$ is greenish yellow without the brown hilum ring. $P\ \widehat{Cm}c\widehat{M}$ is mottled, greenish yellow on white background. All $\widehat{cM}c\widehat{M}$ seed coats are indicated as background colours: $\widehat{Cm}\widehat{Cm}$ seed coats as dark pattern colours; $\widehat{Cm}c\widehat{M}$ seedcoats are mottled in background and dark pattern colour.
3. *D* "hilum ring factor". *P D* has the brown hilum ring with a nearly colourless seed coat.
4. *Sh* "shine factor". *P Sh* is (shiny) pale yellowish buff and has a brown hilum ring. *Sh* always produces a brown hilum ring and makes the seed coat more or less shiny. The effect of *D* with *Sh* is almost imperceptible.
The following six colours are produced by the combination of the three complementary factor pairs *C*(*m*), *c*(*M*), *Dd* and *Sh sh*:—

I. *P* $c\widehat{M}$ *d sh*: white.
II. *P* $\widehat{Cm}$ *d sh*: greenish yellow, more or less mat without brown hilum ring.
III. *P* $c\widehat{M}$ *D sh*: brown hilum ring.
IV. *P* $\widehat{Cm}$ *D sh*: mat yellowish, with brown hilum ring.
V. *P* $c\widehat{M}$ *d Sh*; *P* $c\widehat{M}$ *D Sh* } pale yellowish buff, shiny with brown hilum ring.
VI. *P* $\widehat{Cm}$ *d Sh*; *P* $\widehat{Cm}$ *D Sh* } yellowish, shiny with brown hilum ring.

5. G "yellow-brown factor". *PG* is white or nearly so. *G* changes (shiny) yellowish into yellow-brown.
6. *B* "greenish brown factor". *PB* is white, *B* changes (shiny) yellowish into grey-greenish brown; together with *G* into brown.
7. *V* violet factor. *PV* is white or nearly. *V* changes (shiny) yellowish to (dark) violet; with *G* into (dark) brown violet; with *B*, with or without *G*, into black. *V* causes a violet flower colour ($v_{lac}$ has pale lilac, *v*, a white flower).
*G* and *B* are to be considered as modifying factors, V has a slight complementary effect.
The combined effect of *G*, *B* and *V* changes each of the colours I to VI into a colour series of 8 different genotypes. R. M. I.

630. Kobel, F. 635.652:582(49.4)
Die Stangenbohnensorten der Schweiz. (**The runner bean varieties of Switzerland**).
Landw. Jb. Schweiz **1941** : **55** : 133–75.

A full account (with a well documented introductory historical note) of the varieties of runner bean found in Switzerland.
The author has confined himself to the climbing forms of *Phaseolus vulgaris*. The object of the whole investigation, originally instituted by the Technical Commission of the Swiss Vegetable Union, was to survey and classify the enormous number of existing runner bean varieties and to eliminate any inferior types as well as synonyms in the nomenclature.
Specimens of large numbers of varieties were specially grown from seed for the purpose of study and the collection of data on identifying features and botanical and economic characteristics.
There was a great lack of uniformity as regards varietal purity, which was difficult to explain in view of the practically universal self-pollination of beans. Possibly incompletely fixed

lines obtained from crosses may have been put on the market too soon. Mutation and hybridization have probably also played some part in producing these impure types which can, however, easily be purified by a simple process of careful inbreeding and selection.
The various groups of runner beans according to their uses are given and followed by descriptions of the individual varieties and some illustrations of the pods and seeds of the main types. A key for use in identification is appended.

631. ZAUMEYER, W. J. and HARTER, L. L. 635.652–2.452:576.16:631.521.6:575.11
**Inheritance of resistance to six physiologic races of bean rust.**
J. Agric. Res. 1941 : **63** : 599–622.

The reactions of $F_2$ and $F_3$ progenies from four crosses involving six varieties of beans (*Phaseolus vulgaris*) to races 1, 2, 6, 11, 12 and 17 of rust (*Uromyces phaseoli*) were determined, the plants being tested as seedlings under greenhouse conditions. The parent varieties were No. 765 (highly resistant to races 1 and 2), Pencil Pod Black Wax (very susceptible to races 1 and 2), No. 780 (highly resistant to race 2 and susceptible to race 11), Pinto (very susceptible to races 2, 6, 11, 12 and 17), Cranberry (immune to race 6) and No. 192–48 (immune to races 12 and 17). A number of $F_2$ progenies from these crosses gave ratios of 3 resistant to 1 susceptible when inoculated with races 1, 2, 6 and 12 and ratios of 1 resistant to 2 moderately susceptible to 1 very susceptible when inoculated with races 11 and 17. $F_3$ results supported the hypothesis of the existence of single dominant factors for resistance to races 1 and 2 but suggested that several factors were involved in resistance to races 6 and 12. More than one factor is also probably involved in resistance to race 11 since some $F_2$ progenies were more resistant than either parent. Resistance to race 17 may also involve more than one factor, 3:1 ratios and not 1:2:1 ratios being obtained in the $F_3$'s. Severely variegated plants inoculated with race 6 showed immunity and those mildly variegated a lesser degree of susceptibility than normal plants.

632. WADE, B. L. and ANDRUS, C. F. 635.652–2.8–1.521.6:575.11
**A genetic study of common bean mosaic under conditions of natural field transmission.**
J. Agric. Res. 1941 : **63** : 389–93.

The reactions to common bean mosaic (bean virus 1) of $F_1$, $F_2$ and $F_3$ generation plants of the cross Stringless Black Valentine (tolerant to the virus) x U.S. No. 5 Refugee (immune to the virus) and its reciprocal were determined. The resistance to infection of U.S. No. 5 Refugee was found to be dominant to the tolerance reaction and to be due to a single factor. There was a slight but cumulative deficiency of recessives in the progenies.

633. PSAREV, G. M. and VESELOVSKAYA, Kh. A. 635.655:581.143.26.035.1
**Growth response of soya to daylength in relation to development.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 844–47.

The number of days from germination to flowering, the height of the main stem and the average internode length were determined for twelve varieties of soya beans, the plants being grown under natural length of day conditions, short (10 hours) days and under short day conditions for 3, 5, 8, 10 and 15 days followed by natural day conditions. In all cases the short day treatment reduced the number of days from germination to flowering, the amount of the reduction being different with different varieties. For many varieties the effect of a few days under short day conditions was nearly as great as continuous short days in reducing the number of days from germination to flowering. The height of the main stem was much reduced under short day conditions for long periods but in some cases a short period of short day conditions stimulated the plants to grow taller than the controls which had natural day conditions the whole time.

634. Tschermak-Seysenegg, E. 635.659:581.48:575.22:576.16
Die Bildung von Traganth, eine Parallelvariation in den Samenschalen der Erbse und der wilden Kicher. (**The formation of tragacanth, a parallel variation in the seed coat of the pea and the wild *Astragalus cicer***). Züchter 1940 : **12** : 161–64.

It is shown that the seeds of the wild *Astragalus cicer* L. stick together in the pod. This occurs most commonly in the red-flowered plants and is less frequent in the white-flowered forms. A similar habit has been shown by Vilmorin to exist in the so-called 'pois chenille' form of *Pisum sativum*. In both cases it is probably due to the same gene for the secretion of tragacanth. This represents a parallel variation of a biochemical character in a cultivated form and in a very distantly connected wild species. R. M. I.

# BOOK REVIEWS

575.113
576.312

**Genes and chromosomes—structure and organization. Cold Spring Harbor symposia on quantitative biology.**
George Banta Publishing Company, Menasha, Wisconsin, 1941 : 9 : $4.10 : Pp. x + 315.

The 1941 annual symposium on quantitative biology at Cold Spring Harbor was devoted to genes and chromosomes. Contributions by distinguished workers were presented on genetical, cytological, physical and chemical aspects and these together with the discussions which followed them are published in this handsome volume. Only those of more direct interest to plant breeders are reviewed below. This selection gives a very inadequate idea of the scope and importance of the book, which deserves careful study from all interested in the progress of genetics. The only conspicuous deficiency concerns Darlington's cytogenetical theories. In places these are almost studiously ignored, in places they are in part tacitly accepted, but nowhere are they adequately discussed.

*Warmke, H. E.* *Chromosome continuity and individuality.* (*pp. 1–6*).
Some of the more important results of the study of external chromosome morphology and chromosome behaviour are reviewed with reference to the functions of the chromosomes in heredity.

*Berger, C. A.* *Multiple chromosome complexes in animals and polysomaty in plants.* (*pp. 19–22*).
The two phenomena mentioned are ascribed to the same thing, more frequent divisions of chromosomes, in the resting stage, than divisions of the cell. In the mosquito several divisions of the chromosomes may occur without intervening mitoses but in spinach not more than two.

*McClintock, B.* *Spontaneous alterations in chromosome size and form in Zea mays.* (*pp. 72–81*).
Examples are described of spontaneous chromosomal alterations. They may occur under genic control, following legitimate crossing-over (between homologous segments, in dyscentric hybrids), following illegitimate crossing-over (between apparently non-homologous segments), during or following reduplication of the chromosome, as a result of the instability of broken chromosome ends, during terminalization of chiasmata and, finally, as a result of the aberrant behaviour of a strictly terminal centromere.

*Rhoades, M. M.* *The genetic control of mutability in maize.* (*pp. 138–44*).
After illustrating the range of stability of different genes in maize, the author discusses in some detail the effects of *Dt*, a dominant gene causing mutation of *a* to *A* and hence the production of coloured aleurone spots on a colourless background (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1533, and Vol. XI, Abst. 538).
Most of the mutations are to allelomorphs which may be considered identical, because of their phenotypic effects, with *A*. Some new allelomorphs of *A* have been discovered: $A^{br}$ gives the same deep aleurone and purple plant colour as *A* and $A^{b}$ but produces a recessive brown pericarp; $A^{rb}$ differs from *A* in producing a recessive red-brown pericarp; $a^{br}$ resembles $a^{p}$ in producing pale aleurone colour and red-brown plant colour but differs in that its brown pericarp colour is recessive; $a^{s}$ has the same phenotypic effects as *a* but has a much lower mutation rate in the presence of *Dt*.
It has been confirmed that *Dt* lies in chromosome 9 and established that it lies near the knob at the end of the short arm, possibly to the left of $yg^{2}$.
*Dt* was found to be without effect on the mutation rate of an unstable allelomorph of P. The mutation rate of *a* under the influence of *Dt* at 27° C is about a quarter of that at 15° C.

*Stadler, L. J.* *The comparison of ultraviolet and X-ray effects on mutation.* (*pp. 168–78*).
With reference to maize, the possibilities of making more critical comparisons between the mutations produced by ultra-violet and by X-ray treatment (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 506) are discussed. Of special interest is the possibility that in maize the X-ray mutations are wholly or mostly extra-genic while a considerable proportion of those

induced by ultra-violet behave as though they were true gene mutations, in respect both of their transmission through the gametophytes and of their phenotypic effects. A profitable line of attack on this problem is the study of mutations at selected loci, especially the *A* and *R* loci.

*Gowen, J. W.* — *Mutation in Drosophila, bacteria and viruses.* (*pp. 187–93*).

From the experiments here described it is concluded that the rates at which X-ray induced variants appear in Drosophila, *Phytomonas stewartii* and tobacco mosaic virus (changing from ordinary mosaic to aucuba and *vice versa*) are of the same order. Hence it seems that the mutations in each case are of the same basic type.

*Stanley, W. M. and Knight, C. A.* — *The chemical composition of strains of tobacco mosaic virus.* (*pp. 255–62*).

In 12 preparations of tobacco mosaic virus there were found 3·8, 4·5 and 6·0% of tyrosine, tryptophane and phenylalanine respectively. In 4 variant strains (yellow aucuba, green aucuba, Holmes' masked, and J14D1), which have similar serological properties to mosaic, the same proportions were found. In Holmes' rib grass strain and in cucumber viruses 3 and 4, which are believed to be related to tobacco mosaic virus, there were found different proportions of the amino acids mentioned and also different serological properties. All the strains mentioned had about the same phosphorus content. It appears from this evidence that chemical changes concerned in mutation of virus strains affect the amino-acids rather than the nucleic acid of the virus nucleoprotein.

*Muller, H. J.* — *Résumé and perspectives of the symposium on genes and chromosomes.* (*pp. 290–308*).

In a masterly survey of the material presented at the conference, the author knits together the evidence derived from microscopic study of the chromosomes, from investigations of mutations (gene and chromosome) and from biochemical and physical studies. The result is a thorough and constructive account of the present position of our knowledge of genes and chromosomes. In conclusion he describes a hypothesis to account for the specific attraction which it has been inferred must bring like parts together both in gene synthesis and synapsis, an hypothesis of super-resonance in large protein molecules.

HALL, A. D. 63(42)

**Reconstruction and the land. An approach to farming in the national interest.**

Macmillan & Co., Ltd., London 1941 : 12s. 6d. Pp. xi + 287.

Sir Daniel Hall might well be called the doyen of British agricultural research. His views on the reform of British agriculture therefore deserve such wide and serious consideration that the appearance of this book, at a time when the reconstruction of agriculture is receiving so much attention, will be welcomed.

If we understand him correctly, Sir Daniel's view is that the landlord-tenant system of land tenure is no longer capable of playing its former progressive role in the development of British agriculture, a notable deficiency being its failure to provide the capital necessary for modern methods of farming. He therefore proposes that the state should play the part of enlightened landlord, which involves nationalization of the land, but without the introduction of any socialist measures. It is perhaps rather surprising that the author does not consider what changes in the present organization of agricultural science will be needed to allow it to take advantage of the much greater opportunities which ought to be provided by his reforms. Nevertheless the agricultural scientist will find it a most interesting book.

LEVITT, J. 632.111

**Frost killing and hardiness of plants. A critical review.**

Burgess Publishing Company, Minneapolis, Minn. 1941 : $3.00. Pp. v + 211. (Mimeographed).

While literature reviews on frost injury and resistance are appearing rather frequently nowadays, in view of the importance of the subject it cannot be said that this is undesirable, especially for plant breeders. The book under review is a valuable contribution which

combines a comprehensive survey of the literature with constructive and helpful thinking by the author. It is thus useful both for reference and for study. The three parts into which it is divided deal with frost killing, with frost hardiness and with current theories of the causes of injury and resistance. There are 24 pages of bibliography. An author index would be useful.

633.2:575.1(73)
633.3:575.1(73)

**Fourth Annual Report of the U.S. Regional Pasture Research Laboratory.**

State College, Pa 1940 : Pp. 106. 2 figs. (Mimeographed).

This is a progress report produced for only a limited circulation. The Laboratory concerns itself with the problems of the north eastern states and the table of contents shows that genetical, cytological and breeding work is in progress on *Dactylis, Lolium, Phleum, Poa, Sorghum* and *Trifolium repens* (cf. also "Plant Breeding Abstracts", Vol. XI, Absts 395, 722, 725 and 1009).

Bush, C. D. 634.5(7)

**Nut grower's handbook. A practical guide to the successful propagation, planting, cultivation, harvesting and marketing of nuts.**

Orange Judd Co., New York 1941 : $1.75. Pp. 189. 53 figs.

This book was written to give a practical guide for the successful propagation, planting, cultivation, harvesting and marketing of nuts in North America. The author has for many years made a thorough study of nut growing and he is obviously an enthusiast for this somewhat neglected branch of horticulture. After a preliminary chapter on nut growing and its place in American agriculture, the next seven chapters describe in detail the following nut trees—the chestnut, filberts and other hazels, the English walnut, the black and other walnuts, the pecan and other hickories, the almond and pistachios, pine nuts, acorns and chinquapins. The topics dealt with include the history of the species and of its varieties, the uses of the nuts and other products and the insect pests and diseases. Chapter IX discusses the pollination of nut groves, chapter X planning, planting and pruning: chapter XI, gathering, drying, grading, shelling and marketing; and chapter XII gives a brief description of grafting. The book is illustrated most satisfactorily by a series of good photographs. The production and binding are also attractive.

## NEW JOURNAL

**Bragantia.**

This new journal issuing from Brazil is a continuation of the earlier series of Boletins Técnicos do Instituto Agronômico do Estado de São Paulo. It is to appear at indefinite intervals when the results of the research work of the Institute are ready for publication. The articles are written in Portuguese. The first number contains a long and detailed article on coffee breeding (see Abst. 537 above). (Issued by the Secretaria da Agricultura, Indústria e Comércio do Estado de São Paulo, Instituto Agronômico, Caixa Postal, 28, Campinas, Estado de São Paulo, Brasil.)

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